

# THE IRON AGE

NEW YORK, MARCH 10, 1932

ESTABLISHED 1855

VOL. 129, No. 10

## What Must We Do to the Machine?

THERE can be no retreat from the machine. The essence of mechanization is time saving, and economies in time have been passed along to every one. "Once a better idea or a better mechanism is born there is but one way to kill it and that is by the birth of a still better one," said the author in an address, here abstracted, before the Hungry Club, Pittsburgh, Feb. 29.

The machine has opened more employment doors than it has closed, he asserted, but its continued success as a generator of prosperity depends on the cultivation of mass consumption. This literally means financing the ultimate consumer, through adequate wages and dividends, so that he can buy what the machine can make.

The capital to finance consumption can come from only two sources, according to the author. One source is modernization, through which further gains in efficiency and savings in time can be won. The other is reduction of the non-productive load on the machine.

▲ ▲ ▲

By JOHN H. VAN DEVENTER

Editor, The Iron Age

▼ ▼ ▼

CRITICS of our present method of use of the machine claim that it favors the few and deprives the many; that the fruit of mechanization—wealth—is inequitably distributed; that it tends to make the rich richer, and the poor poorer.

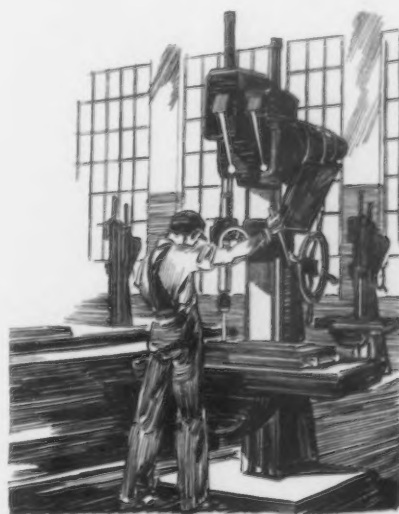
In stating that the machine has distributed its fruits unfairly, these critics, almost without exception, I believe, have overlooked the most important gain that can come to the great mass of mankind through mechanization. This is time saving.

Dollars cannot lengthen life, but time savings can, and do. The average man of today, through time savings secured by mechanization, has a longer relative life, measured in experiences, actions, contacts and accomplishments, than did Methuselah.

In a few hours, through the agency of radio, a product of mechanization, we come into mental contact with more experiences and happenings than could Methuselah in his life time.

One evening at the mechanized movies will give us more vicarious thrills and experiences than our grandfathers encountered in a decade.

The time savings of mechanization,



vastly more important to humanity than its dollar savings, have been passed along to the ultimate consumer, the public. They have been equitably distributed. Time savings cannot be hoarded. Henry Ford's fortune and the hours that he has added to his own relative life span through his life work in mechanization are both insignificant when compared with the time saving that has been passed along to his customers through his work.

Time savings are more real than dollar savings. For the value of the hour and the minute is constantly increasing, whereas the value of the dollar has its ups and downs depending upon gold reserves, rediscount rates and other factors unrelated to the life span.

Thus mechanization, which is the most powerful time saver that man has yet discovered, is the practical substitute for the fabulous fountain of Ponce de Leon. As such, human nature will not relinquish it. Mankind will never give up time saving,



*The savings from better methods and better equipment will finance consumption.*

for to do so would be to shorten its life span. There will be no reversion to the horse and buggy.

Mechanization, in fact, is the outcome of man's irresistible urge toward time saving. The match, a product of mechanization, puts the fire stick and the flint and steel on the scrap pile, not because it costs less but because it saves time in lighting fires. The automobile made the horse and buggy obsolete because it saves people time in going places.

From a consumer's standpoint, time saving is more to be desired than dollar savings. Time bargains open more new markets and keep more old ones going than dollar bargains. The

average automobile still costs more than the average horse and buggy—not only in first cost, but in upkeep. Its economy lies in its miles per hour, which is a time saving.

For this reason, mass production and mass effort, as typified in modern industrial practice, are not likely to be replaced by simpler and less efficient forms of organization. Too much is involved in the matter of time savings. Once a better idea or a better mechanism is born there is but one way to kill it and that is by the birth of a still better one.

#### Working Hours Reduced

It is obvious that the consumer of products produced by a mechanized age, a large majority of whom are also the producers of products, participates automatically in the time savings of the machine. Here, again, we find critics saying that the increased leisure thus produced, when carried to its logical conclusion, must result in technological unemployment.

The shortening of working hours among the large portion of the wage earners of our country has been quite apparent during the building up of the machine age. The 14 and 15-hr. working days, prevalent even in America 75 years ago, have been gradually through mechanization reduced to an 8-hr. standard. As far as it has gone, few people will deny that this curtailment has been beneficial. Naturally, if it should be carried to an extreme, without an equitable redistribution of working opportunity, one might well assume that this time-saving tendency would rob many people of the opportunity of employment. This is the supposition. Let us get at the facts which experience has written into the record.

#### More Machines Idle Than Men

A balance sheet, drawn up for 10 or 20 or 30 or 40-year periods giving either the complete picture of employment in all lines of gainful effort in the United States or the picture of that part of it in our highly mechanized manufacturing industries, proves without the possibility of doubt or question that the machine has opened more employment doors than it has closed.

First let me say that the present abnormal unemployment condition can be by no means ascribed to technological displacement. If it were, we would find our machines busy and our men idle. The reverse is more nearly true. Against an average out of work estimation of 20 per cent for our wage earners, as given by the American Federation of Labor, we

have an average out of work of more nearly 50 per cent for our production equipment. Our machines, in these abnormal times, have experienced more unemployment than have our human workers.

But to come back to the balance sheet. Let us first take the manufacturing industries, the steel plants, automobile plants, shoe factories and all of the varied lines called manufacturing. It is here that we find the hotbed of mechanization and the zenith of mass production. It is here, if anywhere, that the evidence would be apparent were men being deprived of working opportunities by machines.

Forty years ago, in 1889, when the electric motor was being introduced to skeptical industry, when the word "mass production" had not yet been uttered, when mechanical handling was exemplified by the wheelbarrow and the pinch bar, there were 69 human workers per thousand of population employed in all of our manufacturing industries.

#### Actual Gain in Employment Per Thousand

In 1929, after 40 years of intensive mechanization, electrification, organization and automatization, there were 72½ workers per thousand of population in these same manufacturing industries. This final figure, by the way, was higher than the average of the entire 40-year period.

Now let us look at the picture of employment as a whole and see what the machine has done to it during the past 30 years, for the manufacturing wage earners of industry represent but one-fifth of our total number of breadwinners in all occupations.

In 1900, there were 383 breadwinners in the United States for each thousand of population. These included all "gainfully employed" in all lines of industry, agriculture, business, professional service, domestic and public service, etc.

In 1930, we find the density of employment greater instead of less after 30 years of our most intensive mechanization. For there were then 398 breadwinners for each thousand of our population as contrasted with 383 in 1900. A net gain of 15 workers per thousand during the 30-year period.

#### Employment Close to Saturation Point

How much more employment could we have had in 1930, if we had not had all of these machines which are supposed to deprive people of jobs?

I told you that, for every thousand of our population in that year, 398

persons were gainfully employed. But of that total population, 50 were over the age of 65 and 294 were under the age of 14. Taking the working age as between 14 and 65, 606 out of each 1000 of our population within these age limits were employed in 1930. Since some of our folks must stay home to keep the home fires burning, mind the children and take care of the old folks, it is hard to see how, with or without machines, we could expect a greater density of employment than the 60 out of every 100 adults.

#### Consumption Must Be Financed

From the beginning of our intensive "machine age" in 1880, up to 1930, the record shows conclusively that the machine, under its present ownership, has increased and not diminished the density of employment. But, you ask, has this been done at the cost of overproduction?

By adding to our time savings, progressive mechanization enables us to lengthen our relative life span. By adding to our money savings, it enables us to increase our sum total of wealth. Because of these results the pressure to continue to mechanize and modernize will be found irresistible. Obstacles may be placed in its way which will retard, but it cannot be prevented.

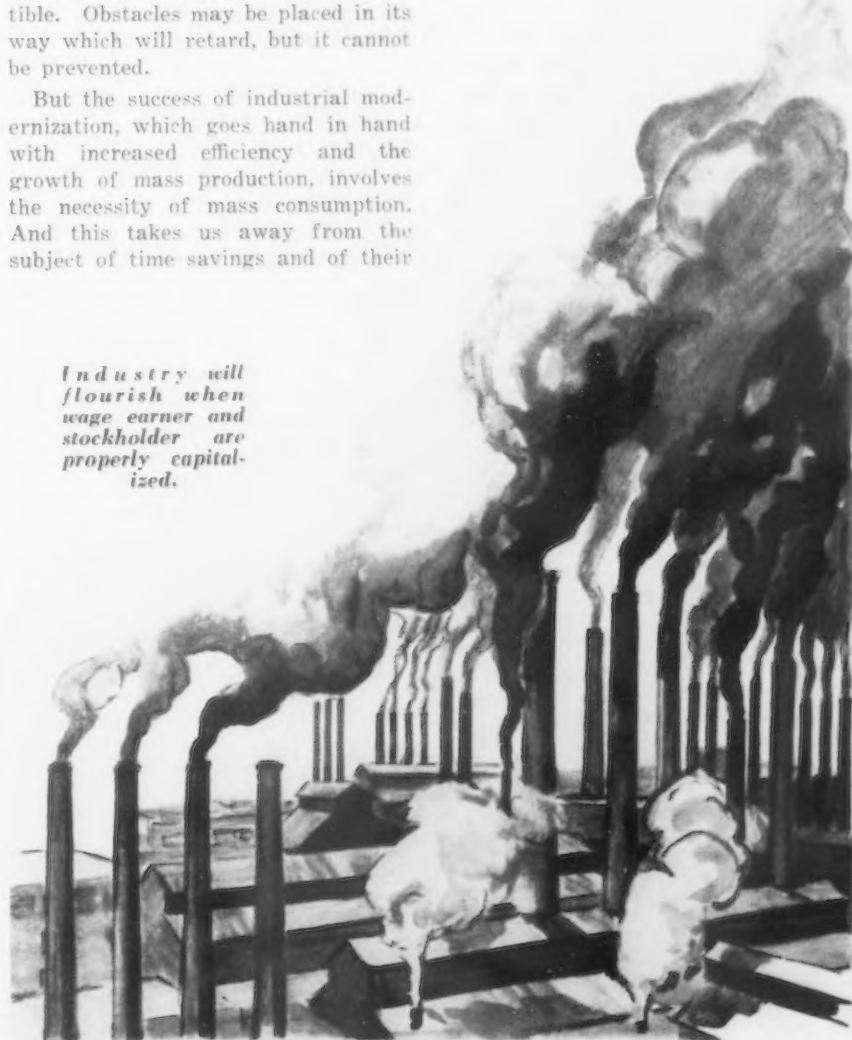
But the success of industrial modernization, which goes hand in hand with increased efficiency and the growth of mass production, involves the necessity of mass consumption. And this takes us away from the subject of time savings and of their

distribution to the public and brings up the matter of money savings made by the machine. For consumption must be financed, otherwise we have overproduction.

Critics of our present use of the machine state that the wealth produced by it has been inequitably distributed—that too large a share of the increased wealth produced by mechanization has gone to capital and too little to labor—that the increases in real wages which constitute a large part of the money wherewith to finance mass consumption have not been compatible with the increase in the production of things to be purchased.

Judging by the widespread wage and salary cuts which have taken place during the last several months one might think that the hitherto fairly well established principle of high wages as a factor in prosperity had gone by the board. I do not think that it has. I believe that the present phase of downward wage and salary adjustments is a temporary and abnormal one compelled by the same maladjustments that have thrown employment out of joint. We

*Industry will flourish when wage earner and stockholder are properly capitalized.*







*Days and weeks  
for the transmis-  
sion of messages  
—the age of the  
pony express will  
never return.*

cannot consider the abnormal as a normal, and it is just as wrong to conclude that the present return on work and money is what we should expect in the future as it would have been to expect a rapid overnight fortune making of 1928 and 1929 to continue as a permanent occurrence, or to accept the belief that sound securities will continue to sell at present ridiculous prices.

#### **Old Idea of Financing Business Inadequate**

It is safe to say that a majority of the most capable managerial minds in both production and distribution are engaged in the large-scale industries which are termed mass production. Brought face to face with the accumulating problems of over-capacity to produce, these leaders of industry are now compelled to give thought to the problem of consumption as it relates to the perpetuation of their businesses.

Many of these men now realize that the old conception of adequate financing of a business concern is quite in-

complete, that no matter how well capitalized a company may be it is not well or adequately capitalized unless its present and prospective customers are sufficiently well capitalized to buy its products.

Mass production is financed through real wages and real dividends; in other words, through the income of the average man or upon the credit based upon it. In the final analysis even the most highly specialized capital investments become consumer products. Trolley cars and power plants that propel them must be ultimately financed by the fares paid by individual consumers of transportation. Sheet mills and machine tool equipment are largely financed by purchases of automobiles and other metal products.

A manufacturing company may have the highest rating on the basis of past performance, may have an enviable surplus in cash and Government bonds and yet be poorly capitalized today because of the shortage of working capital of its customers. And customers are as necessary to

any business as are its officers and board of directors, if not more so.

There are in normal times approximately 40,000,000 people gainfully employed in the United States. Of these a large majority are wage earners. This group constitutes the primary market for the products of practically all of our mass production industries.

#### **Customers Are Undercapitalized**

How are these customers capitalized today to finance consumption?

The National Industrial Conference Board has just issued its compilation of the average earnings of all wage earners in manufacturing industries for November and December of 1931. The average for November was \$20.29 and for December, \$20.74, per week.

After you take from \$20 a week the amounts required for the necessities of life, housing, clothing, food, etc., bearing in mind that this income is not per capita of population but per wage earner, it would not seem as if there would be much surplus wherewith to finance the operation of large-scale production outside of the necessity divisions, even on the basis of our present lower price level.

The men who direct our large-scale industries are not shutting their eyes to this situation. They realize the fact that their own businesses cannot survive and prosper, let alone expand, if there is to be a continuing shrinkage of mass buying power measured in real dollars. You will find, therefore, as I find, that these leaders of industrial activities who are in a sense the owners and managers of the machine are as keenly—one might almost say as selfishly—interested in seeing the wage earner and the stockholder properly capitalized through income as in having a sufficient working capital for their own businesses. Therefore, although compelled now by the force of circumstances to curtail in wages as well as in all other expenditures, they will not tolerate the defeatist's attitude that we must progressively lower the American standard of living in the future, or that American wages must sink to the levels of European and other countries.

The experience of the past few years, however, has taught us that there must be a more intelligent ratio between capital expenditures for production facilities and income, in the form of wages, salaries and dividends, which constitute such a large part of the means of financing the consumption of production.

Where is the money to come from to finance consumption, assuming



*For centuries toil  
from dawn to dark  
yielded only the bar-  
est necessities—me-  
chanical power was  
limited to what wind  
and water mills  
could produce.*



that capital, management and labor were to reach an accord in this matter of the distribution of wealth?

There are but two sources from which additional mass buying power can be had. One is by making a strenuous effort to secure efficiency gains and time savings which will offset and make up for our past losses. The other is to lighten the non-productive load on the machine.

Fortunately, we have a good deal of slack that we can take up in the matter of our industrial efficiency. Our machine, refined as it is compared with the mechanization of other countries, can still be vastly improved. For it is a fact that over 50 per cent of the productive tools of American industry are now obsolete. In other words, because of the possible time saving and dollar saving, it would pay handsomely in wealth increments if we could scrap this 50 per cent of inferior machinery and replace it by modern equipment.

#### Making Up Losses Through Modernization

This is what we call modernization, and such modernization, intelligently applied would quickly make up for the losses that we have experienced.

Invention and improvement, which are the essentials of modernization, have been put to work before in America to make up for depression losses under similar conditions. Successfully, too, even in the face of price declines.

During the period of 30 years following our Civil War, the average of commodity prices declined almost uninterruptedly. During the same period of receding prices we increased our annual output of manufactured products four times in dollar volume, eight times in actual volume, and multiplied the annual industrial wages paid by almost four. It was this performance that laid the foundations for the prosperity which could successfully stand the later terrific punishment of over-capitalization, inflation, speculation, graft, Government interference and excessive taxation, and which failed to be shaken until 1929.

Consciously or unconsciously our predecessors chose the one effective way to build prosperity in the face of price declines. They put improved machinery to work in American industry on such a scale as not merely to compensate for the declining prices but to make increasing profits out of them and to pay increased wages in spite of them. For real wages—measured in purchasing power—doubled during this period of shrinking prices.

*A matter of moments for words to span thousands of miles—time-saving is the most important gain from mechanization.*



Thus prosperity was coaxed back in two ways, by decreasing the cost of products to the consumer and by increasing its average purchasing power through increases in real wages. No other result was possible from this except the ensuing multiplication of business volume and the diversification of industry.

#### Obstacles to Modernization

You may ask why, if this fact is recognized and accepted by industrial leaders—and it is—there has been any hesitation to adopt this policy of modernization. The difficulty has not come from a lack of acceptance on the part of those who manage our machines but because of inability to get the money to finance the purchase of improved equipment. Regardless of the fact that such programs of replacement were designed for cost-saving and time-saving purposes and not for the expansion of plant capacities, frozen credit and the liquidity complex have effectively prevented these improvements. It is possible that the liberalization of credit now being fostered may make this move possible before long.

#### Lightening the Non-Productive Load

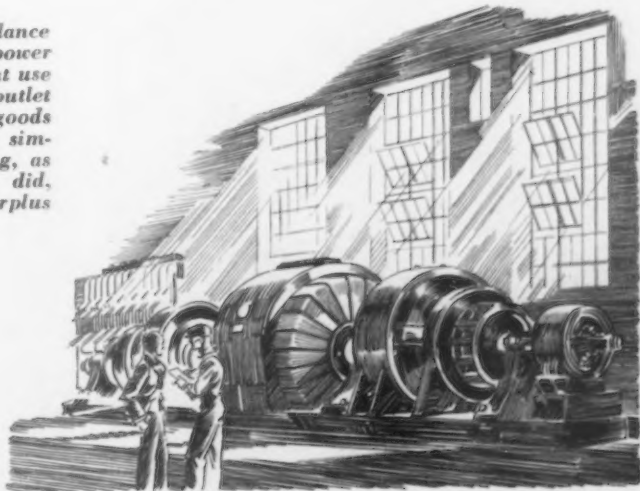
So much for the matter of speeding up our time-saving and wealth-

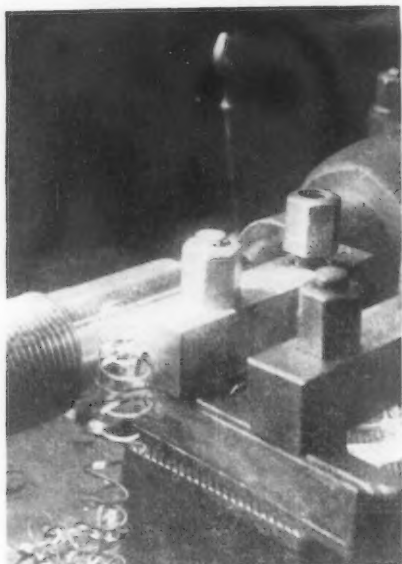
producing machine. The second way to increase mass consuming power is to lighten the non-productive load which has been placed upon the back of our machine.

Before we say that the old gray mare of mechanization which has pulled our prosperity cart so many years so faithfully is not as good as she used to be, we should examine the load that has been placed in her cart—the non-productive load which contributes little or nothing to our use of the machine, or which positively acts as a brake upon it. Such things as over-capitalization, speculation, graft, Government interference in business, excessive taxation, and ever mounting Government cost. Some of these things can be measured definitely in dollars, such as the tremendous rise in the per capita cost of government, State, national and local. Others cannot, but we know that they constitute a tremendous burden which eats up a large portion of the wealth produced by the machine and prevents its more equitable distribution.

We were not content with having the old gray mare increase her speed safely and gradually year after year. Instead of that, we stimulated her with the hypodermic of inflation, and  
(Concluded on page 652)

*Today an abundance of mechanical power awaits intelligent use—finding an outlet for surplus goods should be far simpler than trying, as our forebears did, to satisfy surplus needs.*





IN machining steel with the new tungsten-carbide cutters, much of the heat is carried off in the chip. ▲ ▲ ▲

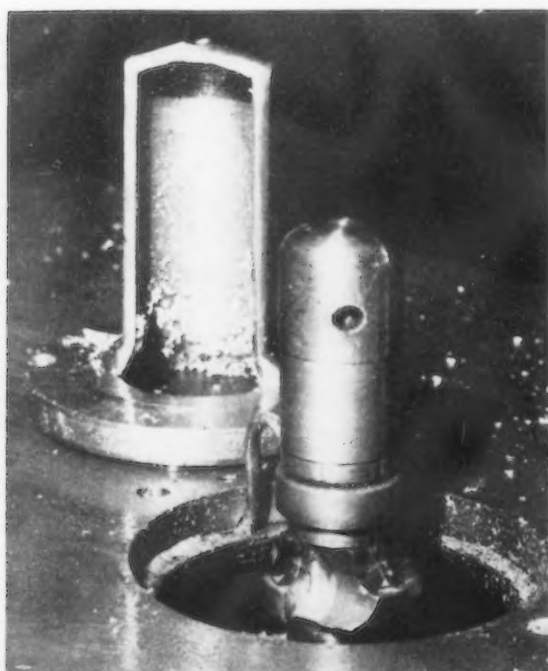
**F**URTHER improvements in the efficiency of hard cemented cutting alloys of the tungsten-carbide-cobalt family have been made by the Firth-Sterling Steel Co., McKeesport, Pa., in the development of a tungsten carbide tip with a binder containing tantalum. As evolved in the Firth-Sterling laboratories by Gregory J. Comstock, the company's director of research, the new alloys are being produced under the so-called "insulation-lubrication theory," which promises to be of considerable importance to future progress in this field of endeavor.

The first of the hard cemented cutting alloys to be produced commercially consisted of small particles of

tungsten carbide cemented with a cobalt-tungsten-carbon alloy. Although generally admitted to be superior to any previous material developed for cutting metals at high speeds, thereby increasing the efficiency of this operation considerably, it was found in general practice that in cutting steel a chip cavity was developed directly behind the cutting edge of the tool. This crater was ordinarily sufficient to shorten materially the cutting life of the tool tipped with the cemented tungsten-carbide alloy and to require periodic grinding with the consequent removal of considerable quantities of the hard alloy tip. This condition was particularly noticeable in the machining of soft steel.

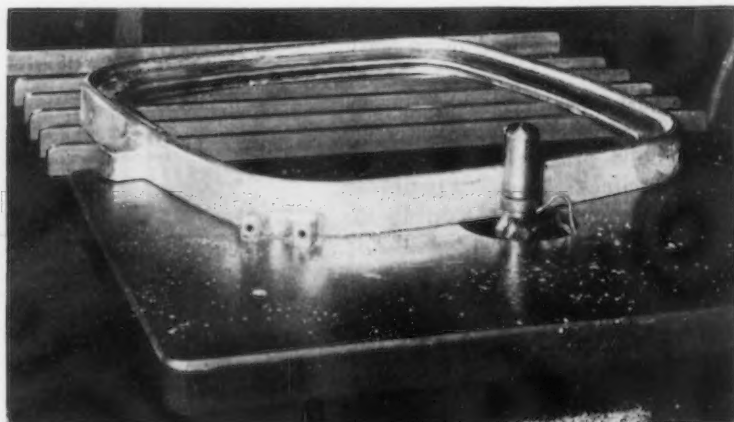
Investigation indicated quite definitely that the formation of such chip cavities was traceable to the seizing of the chips produced in the machining operation to the cemented-carbide material and also to the relatively high heat conductivity of the cutting tip. This forced the heat generated by the high speed operation to be carried off through the ordinary steel shank of the tool, subjecting the entire operation to violent fluctuations of temperature.

Further experimentation brought out the fact that substitution of tantalum-carbide for tungsten-carbide and cementing with a tantalum-carbon-tungsten-cobalt alloy produced a material which would cut steel with-



**TUNGSTEN-CARBIDE** cutter mounted on the spindle of a wood-working machine and used for trimming the corners of a zinc base die casting which, in having a fin very high in silicon, presents a difficult machining problem. A guard is placed over the cutter to protect the operator from the heavy spray of chips.

The tool shown had cut 28 miles of metal up to Nov. 1, producing at the rate of 100 pieces an hour. The tool life is said to be about 80 times that of high-speed steel; the tool requires only hand honing and not regrinding. The probable life of the cutter is estimated at 10,000,000 castings.



# PROVES QUALITY OF G. TOOL ALLOY



Tungsten-carbide and tantalum-carbide tools are being used successfully in machining chromium.

DEVELOPMENT of a new cutting-tool hard alloy—made up of stronger tungsten-carbide particles held in a tantalum-tungsten-carbon and cobalt binder and intended to eliminate cratering and other difficulties of hard alloy tools when used on steel—is outlined in this article.

out developing the objectionable crater behind the cutting edge of the tool. This material, which was applied commercially about a year ago, forms the basis of a new series of alloys which have recently appeared on the market as tantalum-carbide cutting tips.

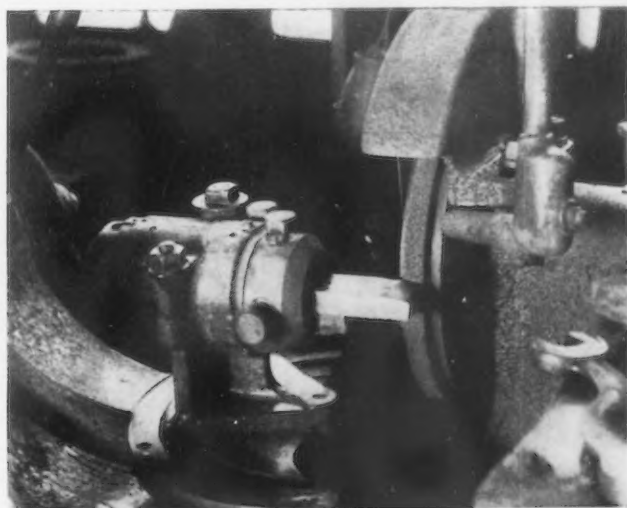
The tantalum-carbide tips have a slightly lower heat conductivity than tungsten-carbide, resulting in a tendency to lower the heat of the tool itself during cutting. Instead, the heat tends to remain in the chip and is conducted away by it rather than transmitted to the cemented carbide

material. The tantalum bearing alloy binder has also been found to be rather slimy or greasy, a characteristic similar to that found in high chromium steels. For this reason it has a tendency to prevent seizing of the chip to the cutting tip. The most serious objection to the material has been its extreme brittleness, as compared with tungsten-carbide. This would tend to shorten the life of the tip in service, and efforts are naturally being made to combine the best features of both the materials.

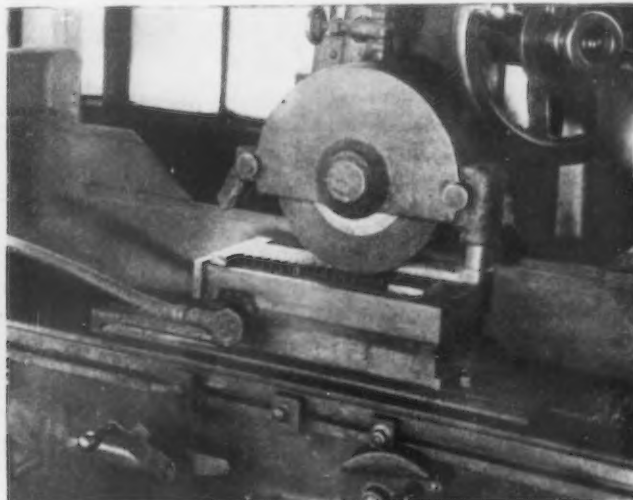
This has led to the formation of the "insulation-lubrication theory" of producing hard cemented cutting alloys now being utilized by the Firth-Sterling company. With the idea of producing a cemented tungsten-carbide material which consists of a stronger tungsten-carbide particle bound with an alloy of tantalum-tungsten-carbon and cobalt, the composition of which is as nearly identical as possible with that which is produced when tantalum-carbide is bonded with cobalt to which some tungsten and carbon have been added, an entire new series of alloys has been developed.

The new alloys made on this principle have demonstrated both in the laboratory and in the field that the cementing of a strong carbide particle with an alloy the character of which is such as to reduce slightly the heat conductivity of the tungsten-carbide-cobalt material first placed on the market is a step in the direction toward lengthening the life of tools. While these alloys use tantalum only as an additive, the addition of tantalum can be made most satisfactorily by combining it in the carbide form. The carbon content of tantalum-carbide happens to be almost identical with that of the higher carbide of tungsten which assists materially in the mechanics of reprecipitation of tungsten-carbide during the final sintering. Fortunately, also, tantalum-carbide is a heavy material, although slightly lower in specific gravity than tungsten-carbide. While too much emphasis may possibly be placed on the necessity for using heavy carbides, it is undoubtedly true that materials high in specific gravity lend themselves much more readily to the sintering process.

Set-up for grinding the tungsten-carbide tools.



Another grinding operation—a group of tipped tools being ground on a surface grinder.





# COPPER BRAZING APPLICATIONS

By H. M. WEBBER

Industrial Department, General Electric Co.  
Schenectady, N. Y.

**C**OPPER brazing as applied with electric furnaces having controlled atmospheres is being used by various manufacturers for their industrial processes, affording economies and unique methods of assembly which have a specific value in each method of manufacture. In this article several copper-brazing furnace installations will be described, along with a description of the products made and their advantages.

When utilizing the copper-brazing process, steel objects are charged into furnaces with controlled atmospheres, copper being applied near the joints of the parts. Each assembly is brought up uniformly to a temperature above the melting point of copper, at which state the copper flows into the seams by the aid of capillary attraction. The controlled atmosphere within the furnace acts as an agent to clean the surfaces of the steel, similar to the function of fluxes used in other methods.

This allows the molten copper to wet the surface and, since copper and iron have some affinity for one another at the brazing temperature, an alloying effect takes place which gives a strong bond upon cooling. The parts are ordinarily cooled in the controlled atmosphere, so that they come from the furnaces bright and clean.

The copper-brazing process has had a rather general application in the manufacture of tungsten-carbide tools, since it affords a very convenient means of fastening the tips into their shanks. Henry Disston & Sons, Inc., Philadelphia, has developed an interesting line of inserted and solid-tooth disk saws, circular cutters, radius cutters, planer tool bits, etc., such as those shown in Fig. 1.

Checking or cracking of the bits during assembly, as well as oxidation which frequently results when using other methods, are practically eliminated by using the copper-brazing

process for fastening the inserts in place.

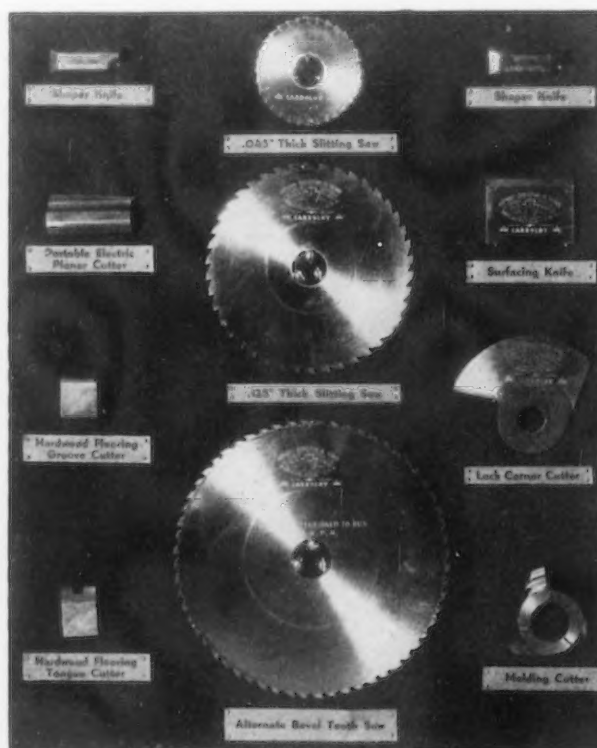
When brazing, the tools are loaded on small trays and charged into the furnace, one tray at a time, copper in any one of several convenient forms being placed near the joints where the tungsten-carbide alloy inserts rest in recesses in the shanks. After the charge is brazed it is pushed on into the cooling chamber and replaced with a new charge in the heating chamber. The cooler is long enough to hold two trays, to provide a cooling period twice that of the heating-up time. The charging cycle described above can be repeated after one tray has been removed from the cooler through a door at the discharge end of the furnace.

A 10-kw. furnace is used for this work, rated 220 volts, 1-phase, 60 cycles, and illustrated in Fig. 2. The

working dimensions are 6 in. wide by 4 in. high by 24 in. long. The trays, by means of which the work is charged, are about 5½ in. wide by 14 in. long. The front door of the furnace slides at an angle on a cast iron door frame, and the back door is of the hinge and latch type. Both of these arrangements effectively seal gas within the furnace when the doors are closed.

A screen of illuminating gas flame projects up across each of the door openings when charging and discharging the furnace, to minimize the diffusion of air into the chambers and conserve the gas used for the controlled atmosphere. In this instance tanked hydrogen is employed for the controlled atmosphere, being supplied in drums and piped to the furnace from a convenient location.

Between the heating and cooling



**FIG. 1**—Group of tungsten-carbide alloy tools with inserts copper-brazed in place.



# NS UNDER ATMOSPHERIC CONTROL

**E**LECTRIC brazing furnaces with controlled atmospheres have found practical application in the fabrication of various products, among them tungsten-carbide tools, golf club shafts and steel tubing. Atmospheric control, the author states, prevents oxidation and acts as an agent to clean the steel surface, like a flux. Use of this method in brazing steel tubing will be described in the second and concluding portion of this article.

chambers of this furnace are two doors, one being a fire-clay heat baffle to assist in retaining heat within the furnace chamber. The other door is a gas-tight gate valve, adjacent to the heat baffle, within the cooling chamber, the function of which is to prevent the formation of circulating gas currents. Since the molybdenum resistors are quite sensitive to oxidation, this gas-tight door contributes largely to the success of the furnace by preventing an in-rush of air when the end doors are open. This inner door is, of course, kept closed as much as possible during the charging or discharging of work, but is raised during

the transfer of trays from the heater to the cooler.

Molybdenum wire resistors are mounted on the side walls and roof of the heating chamber, being wound sinusoidally on thin alundum slabs. This arrangement supplies direct radiant heat to the work, and the resistors have a reasonably long life considering the service imposed upon them. They are quite sensitive to oxidation at the copper-brazing temperature, the molybdenum oxide passing off into the atmosphere as a white vapor, which reduces the diameter of the wire whenever air currents come in contact with the resistors. For

this reason, it is necessary to resort to the precautions in furnace design described above.

Fig. 3 illustrates a copper-brazing furnace utilized by a large automobile manufacturer for experimental purposes with a view to applying copper brazing in the fabrication of various parts of his product. This furnace is of the bell type, rated 65 kw., 110 volts, 3-phase, 60 cycles, and has working dimensions 19 in. diameter by 32 in. high. Nickel-chromium ribbon resistors are mounted on the side walls.

When charging, the furnace is raised, a load is mounted on the pedestal shown, and the furnace is then lowered over the charge on to the shot seal around the base. After a load has been heated and brazed, it is allowed to cool within the furnace to a temperature suitable for exposure of the work to the air. The furnace can be lifted while it is filled with the controlled atmosphere, since the gas will burn in a sheet of flame across the lower opening, provided

**FIG. 2**—Electric furnace with controlled atmosphere for copper brazing tungsten-carbide alloy tools at Henry Disston & Sons, Inc., Philadelphia.

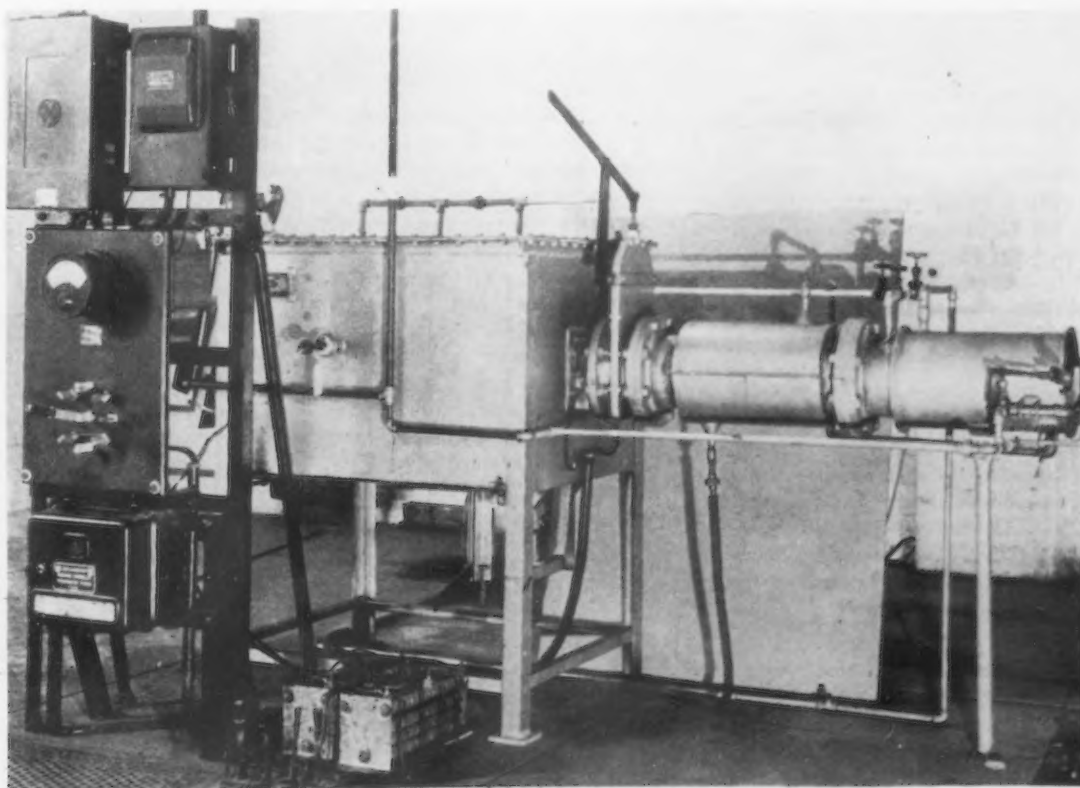
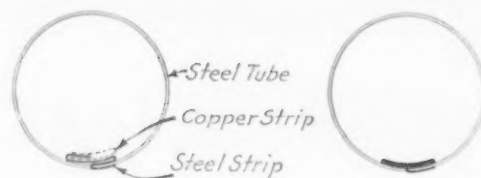




FIG. 3—Bell-type furnace used experimentally for copper-brazing work. (At left.)

FIG. 4—Sections of golf shaft before and after copper brazing. Copper carried by steel strip melts into joint and forms bond as shown.



uniformity of the product. Steel of 1 per cent carbon is used and springiness is brought out by a quenching treatment. After the shafts are copper brazed, they are normalized to restore the grain structure, and then hardened and drawn. Many of them are plated, usually with copper, to improve the appearance and give protection against corrosion.

A battery of four electric furnaces with controlled atmospheres is employed for the copper-brazing operation. They are of the muffle type, the muffles being "D"-shaped alundum tubes about 10 in. wide by 4 in. high by 22 in. long. A molybdenum wire resistor, spirally wrapped about the

tube, maintains the necessary temperature within the furnace chamber. A water-jacketed cooling chamber is mounted at the outgoing end of each furnace, attached to which is an oil discharge seal, supplying an outlet for the work.

In production, eight shafts are slowly pushed into the furnace by a mechanically-operated pusher operating on a cycle of about 6 min. The front end of the furnace is always open to accommodate the golf shafts and charging mechanism, while the discharge end is always closed by the oil seal. Electrolene is used for the controlled atmosphere.

(To be concluded)

it is ignited at the instant the furnace is raised from its seal and a sufficient supply of gas is maintained to support the combustion.

### Brazing Golf Club Shafts

ONE example of copper-brazed steel tubing can be found in the golf club shafts which have been made for several years by the Horton Mfg. Co., Bristol, Conn. The golf shafts are unusual in that they are formed on a taper to their final shape, with a butt joint as a seam. Fig. 4 indicates the manner in which the assembly of the shaft is fabricated. At the left is shown a specially formed steel strip which has been drawn into the seam—a patented feature. The function of this strip is twofold. It overlaps the surfaces of the steel on each side of the butt joint, for reinforcement, and it carries a strip of copper.

This copper melts when the shaft is pushed through the copper-brazing furnace, and flows throughout the joint to form a bond as illustrated at right. After copper brazing, the part of the steel strip remaining on the outside of the shaft is ground off, leaving a smooth exterior surface.

An advantage of manufacturing the product in this manner is the ability to control the carbon content of the steel. The uniform distribution of carbon in the original stock insures

## A Stainless Steel Welding Problem

▲ ▲ ▲

ALTHOUGH the welding of stainless steel is no longer difficult, an unusual application sometimes arises which offers more of a problem than the mere welding process. Such a problem presented itself recently and its solution offers a possible aid to many others using this comparatively new alloy.

In making an Allegheny metal food container, a manufacturer wanted to solder the seam on the inside of the tank, also to weld along the outer flange for greater strength. Solder would cover the seam smoothly and prevent food particles from lodging which might decay and contaminate subsequent batches. He found, however, that after the welding operation had been performed, a hard oxide deposit in the seam prevented the solder from adhering. If the process were reversed, the high temperature required for welding (3200 deg. F.) would melt the solder (Melting point —450 deg. F.).



Engineers of Joseph T. Ryerson & Son, Inc., Chicago, suggested a plan that was successfully demonstrated before the Waukegan, Ill., Welding Society recently. To avoid the objectionable deposit of oxide, the tank was soldered and partly filled with water before welding. The water served to check the intense welding heat that followed, and prevented the solder from melting.

Ryerson Allegheny Metal Welding Rod and a Type "S" Wilson Welder were used in conducting this test. An Allegheny solder and special flux carried were supplied for the soldering application.

Production of galvanized sheet metal ware in December, 1931, rose to 72,558 doz. from 67,145 doz. in November and for the year aggregated 1,326,511 doz., against 1,312,097 doz. in 1930.

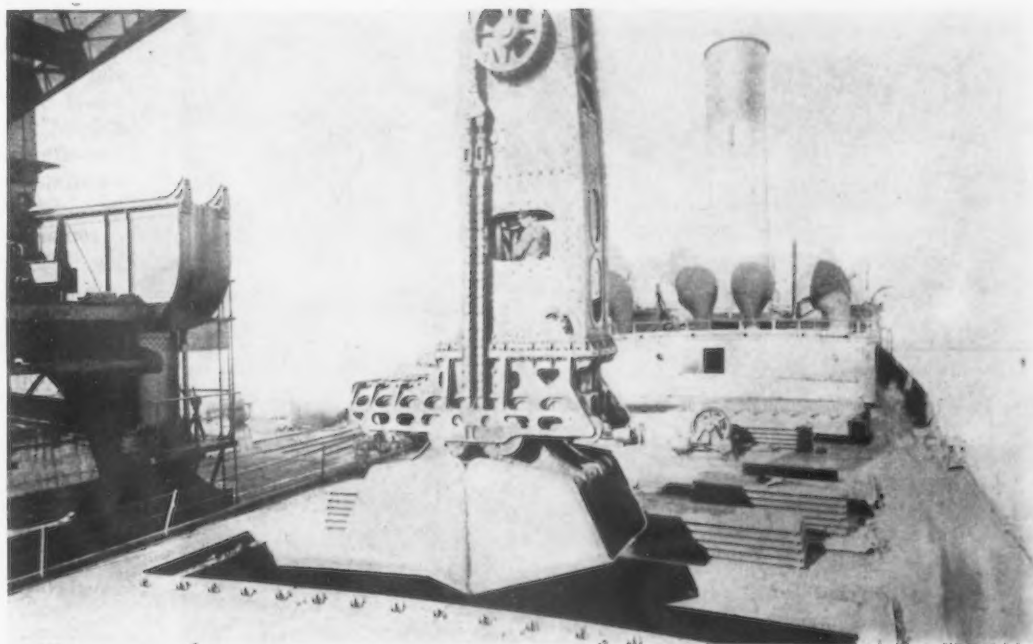


# Unloading Giants Serve Ships

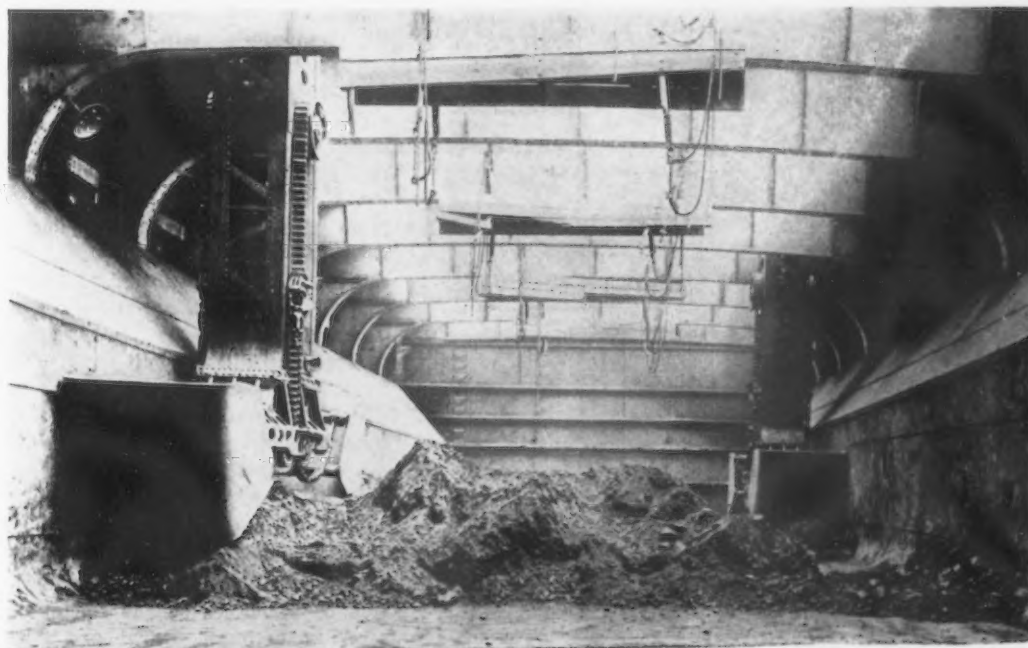


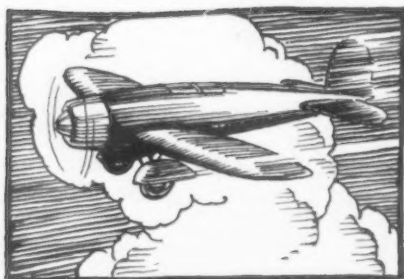
THE handling devices used for unloading boats on the Great Lakes have to be large in capacity and quick in operation so as to permit ships to make as many trips as possible during a short season. Some docks are equipped with unloaders of this type, four of which are operating on one boat at the same time. Note the load can be deposited in railroad cars or into the storage bins for distribution by the gantry crane.

THIS is a close-up of the business end of the unloaders shown above. Two operators are required for one of these machines. One operator is stationed in the bucket leg directly over the bucket and he controls the raising and lowering of the bucket and the travel of machine between hatches. The other operator is stationed in a cab on the larry, which is in the bridge of the machine and which transfers the load from the bucket to cars or storage piles. He controls the movement of the larry, the operation of the larry gates, and the weighing of the load.

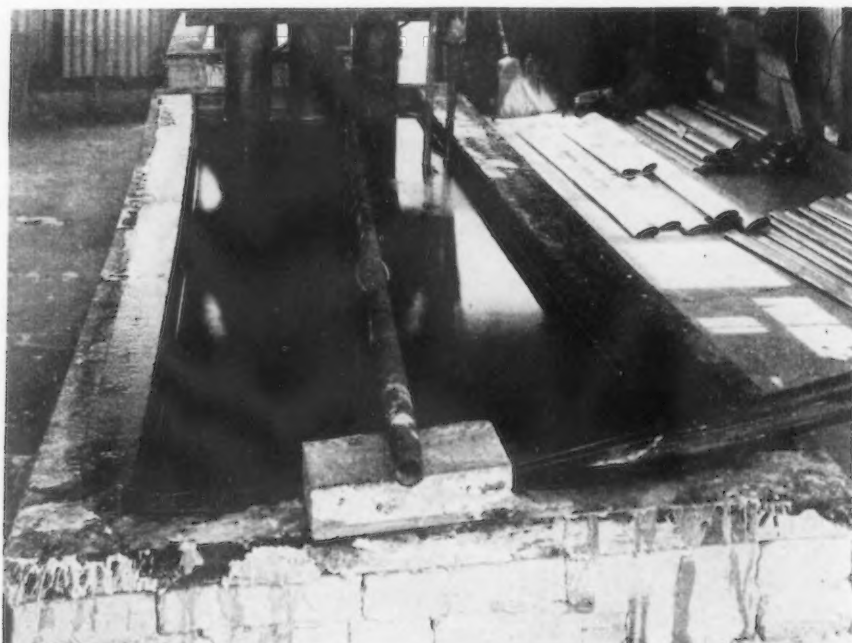


ONE of the features of the unloaders is that the bucket leg rotates in a complete circle which permits it to go into narrow hatches and yet turn in any direction to gather a load. This view shows two buckets in the hold of the ship. When the cargo is nearly unloaded it is necessary to clean up into piles with shovels. The buckets are built in capacities up to 15 tons and it is possible for one unloader to handle from 500 to 1000 tons per hour.

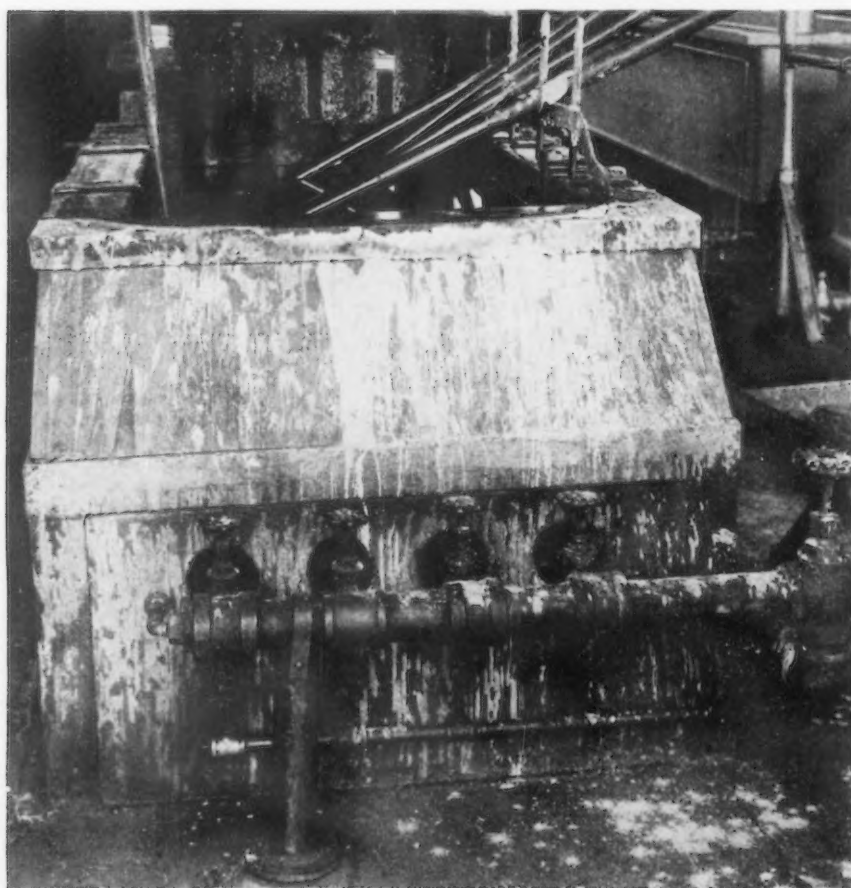




# ALUMINUM ALLOY AIR TREATED



Tank for heat treating duralumin at the plant of the Boeing Airplane Co., Seattle, Wash.



Close-up of heat-treating tank showing gas burners at the front and the flues at the back.

**T**HERE are two distinct types of equipment for heat treating aluminum and its alloys, including duralumin, and advantages are claimed by exponents of each. The first type is the regulation brick furnace, the parts being placed directly in the heating chamber, while the second type is a tank of hot liquid in which the parts are immersed. The heat-treating technique, including temperatures, heating periods, quenches, aging, etc., are equally applicable in both types as is gas, a commonly used fuel in heat treating.

One of the world's largest airplane manufacturers, the Boeing Airplane Co. of Seattle, Wash., uses the immersion type of heat-treating equipment. This company, operating commercial passenger-mail lines from coast to coast and from Mexico to Canada, builds planes for some of the most important interests in the country as well as for the Government.

## Aging Temporarily Suspended

Several novel features, based on recent research, have been introduced among the heat-treating practices in this company's plant. One of these is the temporary suspension of aging in duralumin rivets after treating, until they can be used. This is accomplished by putting the rivets directly from the quench into a refrigerator which is cooled with dry ice from plus 10 to minus 40 deg. F. Previous to this, small batches were treated from time to time throughout the day, but with the new practice enough can be treated each morning to last out the day, in fact several days. A considerable saving is thus effected not only in labor but in fuel consumption. Furthermore, this piece of heat-treating equipment is free for uninterrupted service throughout the remainder of the day.

A large quantity of aluminum and aluminum alloy is used in the production of airplanes at the Boeing factory. Aluminum, Dural and Alclad are utilized extensively for surface

# AIR PLANE PARTS HEAT TREATED BY IMMERSION PROCESS

By J. B. NEALEY

covering, cowling, seats, flooring, tanks and other parts, as well as for structural, tubing and strutwork. All duralumin parts are heat treated for hardening and toughening in the sheet metal heat-treating department, which adjoins the sheet metal division of the plant's large metal-working unit.

## How the Hot-Solution Tanks Are Arranged

This department is equipped with three hot-solution bath tanks and each of these is paired with cold water tanks of similar size and construction. The heating medium in these tanks is a 50-50 solution of potassium and sodium nitrate, which is kept at a temperature of 940 to 950 deg. F. One of these tanks is 16 ft. long, 30 in. wide and 24 in. high inside, while the other two are of the same cross-sectional dimension and 10 ft. and 4 ft. long respectively. Each of these tanks is heated with gas burners firing into pipes lying

A LARGE airplane manufacturing plant uses a novel method for heat treating parts made of aluminum alloys. As described in this article, these parts are immersed in hot and cold solutions of certain salts to bring out the properties desired. Dry ice is also used temporarily to suspend at low temperatures the aging of aluminum alloy rivets.

near the bottom. In two of these tanks there are three burners and pipes and in the other four.

One end of each pipe is welded into the end of the tank close to the bottom, the burner being outside of the tank and firing into the pipe. The other end of the pipe turns up and protrudes above the surface of the bath and all products of combustion are collected by a hood and ventilated

to the atmosphere with an induced draft jet. Two of the quench tanks are heated with similar burners, the parts being quenched in cold water and then washed in the hot water. Each of the hot-solution tanks has a thermocouple, which is connected with a switchboard and recording and indicating pyrometers.

## How the Aluminum Alloy Rivets Are Treated

The rivets are charged into steel pipes 4 ft. long and 1½ in. in diameter, sealed at one end and open at the other and these pipes are then set with closed end into one of the tanks, and left there for about half an hour. They are then removed and poured into a perforated dipper that is held under the surface of the cold water quench, where they are allowed to remain for a few seconds, following which they are placed in containers and put into the refrigerator, from which they are removed as used.

(Concluded on page 628)



Three gas fired heat-treating baths accommodate the increasingly large volume of duralumin heat treating required in the manufacture of Boeing planes.



# WHY BALL AND ROLLER BEARINGS

**B**ALL and roller bearings are an improvement over plain bearings because the loss of power in transmitting motion by rolling friction is considerably less than by sliding friction. The term "anti-friction" frequently applied to ball and roller bearings is meant to be used in a relative sense only, as friction in several forms is present, and necessitates the use of a lubricating medium to prolong the life of the bearings in actual service. The importance of proper lubrication of ball and roller bearings can be best realized from a detailed analysis of the relative motion of the bearing elements and the involved stresses.

True rolling motion is closely approached in well-designed ball and roller bearings, but due to the elastic properties of all materials and to the mechanical construction, the rolling motion is unavoidably accompanied by a varying amount of slipping and sliding. Fig. 1 illustrates in axial cross-section a deep-groove ball bearing, showing in exaggerated form the effect of load on the elastic deformation of the bearing elements which results in friction.

## Contact Surface Elliptical

The theoretical contact between the ball and the race grooves is a point, but actually—due to the elasticity of the steel—it is in the form of an elliptical surface, the area of which is dependent upon the design of the bearing and varies with the applied load. The ball revolves about axis X-X, and it is obvious that radii *ab* and *cd* are of unequal length, which accounts for a certain amount of slipping in the pressure area, forming one source of friction.

It is to be noted that the shape of the contact ellipse on the inner race is different than on the outer race, on account of the difference in the relative curvature of the surfaces in contact—being convex on the inner race and concave on the outer race, with reference to the circular section of the ball or roller. (See Fig. 4.) In a correctly designed ball bearing, the radii of the grooves in the outer and inner races are so proportioned to the diameter of the balls that the contact

areas, and consequently the stress fatigue, are the same on both races.

Equalization of contact areas is often accomplished by making the radii of the outer and inner race grooves  $9/16$  and  $25/64$  of the ball diameter, respectively. As the contact area on the inner race is longer and narrower, it follows that there is a slightly greater amount of slipping friction against the inner race than on the outer race.

## Lubricant Useful Between Contact Surfaces

Referring now to Fig. 2, which shows a view through the middle of the bearing, perpendicular to its axis, it may be observed that the balls under pressure become slightly flattened, and the grooved surfaces in both races are also slightly flattened under compression of material due to applied load. These deformations are all within the elastic range of the steel, so that while they are continuous in nature, yet they are not permanent, although

they involve an expenditure of energy manifested as heat due to the movement of the steel grains. While the internal friction of the steel cannot be reduced by the application of a lubricant to the exterior surfaces, it is quite obvious that true rolling motion no longer exists, and a certain amount of slipping friction is present at the contact surfaces, which can be minimized by proper lubrication.

Some ball bearing engineers are of the opinion that no film of lubricant can exist between the contact surfaces of the balls and races in a heavily loaded bearing on account of the enormous pressure present. Whatever the actual conditions may be—which are extremely difficult to prove one way or the other—it appears logical that however much the lubricant film may be distorted or broken up, even a minute quantity of lubricant lodged in the pores of the metallic surfaces should perform a useful function.

A third cause of pure sliding friction exists between the individual

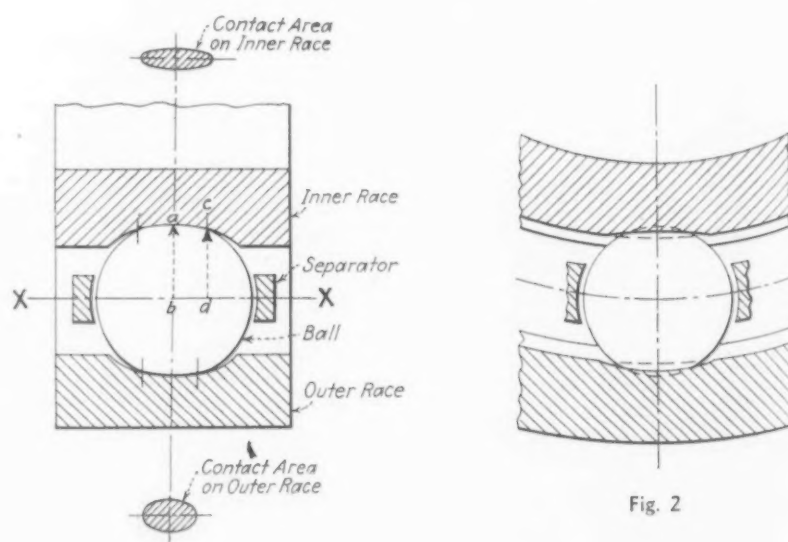


Fig. 1

Fig. 1.—Illustrating the effect of load stresses on the bearing elements of a single-row deep-groove ball bearing. The elastic deformation of the bearing elements under load on a section taken through the races and rolling element is shown to be taken up by the compressibility of the steel. Fig. 4.—Showing the nature of contact or tangential slipping between the races and the balls.

# INGS REQUIRE LUBRICATION

By MAURICE RESWICK

Chief Engineer,  
Pennsylvania Lubricating Co.,  
Pittsburgh

**O**PINIONS regarding the function of lubricants for anti-friction bearings vary widely. Some attach undue importance to lubrication; others appear to minimize it. In view of this, Mr. Reswick's engineering analysis of the operation of ball and roller bearings, and his conclusions relating to proper lubrication, should be of timely interest.

In a second article, he will discuss the properties of the lubricants and their applications, including those for extreme pressure conditions, as in rolling mill bearings.

balls and the cage or ball retainers. This is particularly true in the case of high speed annular bearings and in thrust bearings having flat races, where the action of centrifugal force and spinning increases the friction of the balls against the ball retaining cage.

In the case of cylindrical roller bearings, the theoretical contact is a line, but actually it is an elongated rectangle, as shown in Fig. 3. Friction in the form of slipping is present

from the contact surfaces of the rollers and races and also from sliding contact against the separators or cages. Additional causes of sliding friction are produced at the guiding flanges on the inner race where they come in contact with the ends of the rollers, and further slipping is caused in overcoming the tendency of the rollers to skew between the races and in maintaining axial alinement of the rollers. This applies in varying degrees to roller bearings of every type,

whether cylindrical, tapered, helical, spherical, or of any other form.

The elastic deformation of the bearing elements introduces fatigue stresses in the metal, while the slipping and sliding friction, particularly that between cage and rolling elements, further produces power losses in the form of frictional heat, and as the speed of the bearing is increased, some of these factors become more pronounced. Due to the more frequent recurrence of stress with speed increase, the load rating of ball and roller bearings must be decreased with an increase in operating speed. However, while lubrication of ball and roller bearings is not a factor in determination of bearing capacity, it is of great importance in assuring a reasonably long life to the bearing, and the selection of a proper lubricant will in many cases increase the safe operating speed rating of ball and roller bearings.

An equally important function of the lubricant is to protect the highly finished surfaces of the balls, rollers and races from corrosive action. Atmospheric moisture and acid or alkali fumes will attack the bearing, and once pitting or rusting is started, the life of the bearing is greatly reduced through increased local stress and wear by setting up abrasion from iron oxide.

## Effective Grease Seal Important Function of Lubricant

When a good grade of neutral grease is used as the lubricant, it acts also as a seal excluding the infiltration of dust and dirt into the live bearing elements. When the surroundings are particularly dirty, an effective grease seal may be considered as the most important function of the lubricant. For best results the design of the bearing housing should include grease slinger seals.

Lubricants in ball and roller bearings serve, then, the following purposes, in the order of their importance:

1.—Reduce friction at the points of sliding contact between the ball or

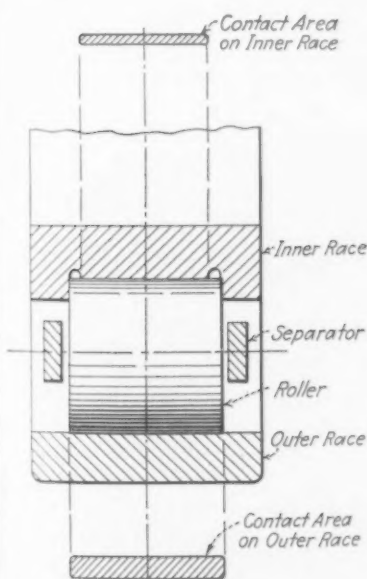


Fig. 3

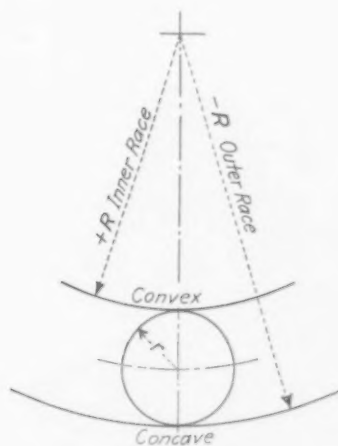


Fig. 4

deep-groove ball bearing of typical design. Fig. 2.—Showing in exaggerated form the middle of a ball or roller bearing perpendicular to the bearing axis. The "flattening" steel. Fig. 3.—Illustrating the effect of load stresses on a cylindrical-type roller between a ball or roller and the races in a bearing.

roller and the separator cage, guiding flanges or grooves, and in the deformed contact or pressure area on the races.

2.—Prevent corrosion by forming a protective coating.

3.—Form a seal which excludes infiltration of dust, dirt and water.

4.—Carry away and dissipate the heat generated in the localized friction areas.

#### Characteristics Required of a Lubricant

Both grease and oil are used in the lubrication of roller bearings. Grease is used in a majority of applications, while oil is used under special conditions where high speed and other considerations are the governing factors. A further analysis of the factors entering into the design and operation of ball and roller bearings such as stresses, loads and velocities, will give a better understanding as to what is demanded from an efficient lubricant.

In a well designed or properly selected bearing for a particular application, the proportion of the elements, such as size of shaft diameter, number and diameter of balls or rollers, and operating speed is such that a liberal factor of safety is provided all around. Unit pressure at the contact areas, rate of deformation of surfaces, fatigue and sliding friction against the guides and retainers are held within practical limits.

An examination of the load rating tables of manufacturers of ball and roller bearings shows that these relationships, with slight variations by different manufacturers, are expressed very closely by the following formulas:

$$(1) \frac{P}{P_1} = \frac{D_1^{1.45}}{D_1^{1.45}} = \frac{N d_1^2}{N_1 d_1^2} = \frac{n_1^{1/3}}{n^{1/3}}$$

Load                      Shaft Diameter                      Number and Size of Balls                      Speed in Rev. per Min.

where  $P$  = rated load,  $D$  = shaft diameter,  $N$  = number of balls of diameter  $d$ , and  $n$  = speed in revolutions per minute for any given condition, while  $P_1$ ,  $D_1$ ,  $N_1$ ,  $d_1$  and  $n_1$  are the corresponding values for any required conditions.

Formula (1) may be recast into several independent expressions, showing the direct instead of the proportional relationship of the various factors with reference to load rating. Thus, with size and number of balls

or rollers and speed remaining constant

$$(2) P = K D^{1.45};$$

with shaft diameter and speed remaining constant

$$(3) P = K' N d^2;$$

and similarly with  $D$  and  $N d^2$  remaining constant

$$(4) P = K'' \frac{1}{n^{1/3}}$$

where  $K$ ,  $K'$  and  $K''$  are constants depending on the design of the bearing and its rating for any particular conditions.

#### Nature of Contact in Bearings of Different Size

The nature of contact between the balls or rollers and the races in bearings of different size can also be analyzed in mathematical terms. In general, when two cylinders are tangent to each other, the contact line at the point of tangency,  $C$ , is determined by the following formula:

$$(5) C = \frac{1}{\frac{1}{r} + \frac{1}{R}}$$

where  $r$  and  $R$  are the radii of the respective cylinders tangent to each other. This formula applies also in determining the contact line of two spheres in any plane through their point of tangency.\* Referring to Fig. 4, it is seen that  $r$  is the radius of the balls or rollers, while  $R$  is the radius of the surfaces of the outer or inner races, as the case may be.

It will be observed from formulas (1), (2) and (3) that as the load rating is increased, there is a corresponding increase in the diameters of the races and balls or rollers (together with their number). From formula (5) it is seen that the contact surface or pressure area becomes greater as the size of the bearing is increased. From the standpoint of metal fatigue and specific pressure this is an advantage, because the unit pressure in large bearings is not necessarily greater than it is in bearings of smaller sizes. But an increase in contact area also means a departure from true rolling motion between the balls or rollers and the races, and the sliding friction against the separators and guides is also greater in the larger bearing on account of the increase in the peripheral speed of the inner race. The problem of lubrication, therefore, becomes more difficult as the size of the bearing is increased. This is proved in practice by the fact that the operating temperature is greater in large size bearings than in smaller bearings when operated at the same speed under proportionate loads.

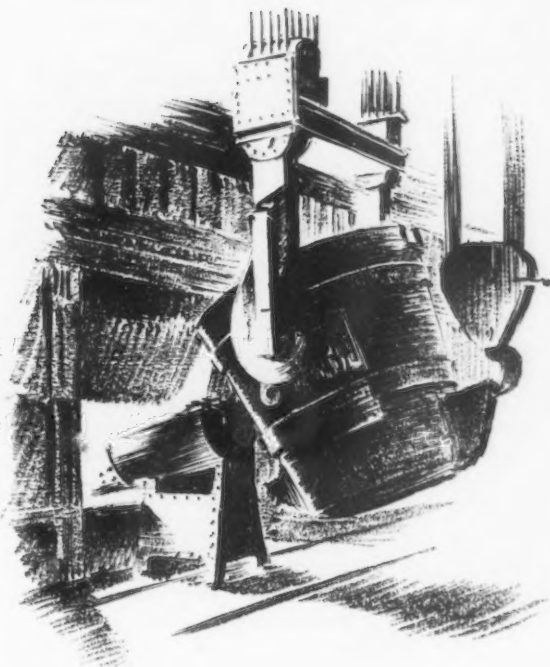
From formulas (1) and (4) it is seen also that the rated load for any one bearing varies *inversely* as the cube root of the speed. This is due primarily to the greater rate of deformation of the surfaces and of sliding friction, which is manifested by a rise in operating temperature.

**BAKELITE CORPN.** starts the year with confidence in the future, evidenced by the opening of their new plant in Bound Brook, N. J. It is shown below, situated on their 100 acre site. The entire layout and equipment were planned especially for the efficient production of uniform Bakelite materials.



\*For development of formula (5) refer to "American Machinist Gear Book," by Logue and Trautschold, McGraw-Hill Book Co., New York, 1922.





# GASES EVOLVED FROM MOLTEN METAL

By HENRY D. HIBBARD

Consulting Metallurgical Engineer, Plainfield, N. J.

**T**HE gases evolved from the molten metal in the open-hearth furnace are chiefly those which cause the "boil" and those which the boiling gases carry off. The chief boiling gas by far is carbon monoxide (CO), for when there is no carbon in the metal there is no boil, and when only a few points of carbon are present the boil is limited to a few small scattered bubbles in sight at one time. In one determination Campbell found the gases expelled from a (low-carbon?) open-hearth bath, presumably the same as the boiling gas, to be 82 per cent CO, 4 per cent hydrogen, 9 per cent CO<sub>2</sub>, 1 per cent oxygen and 4 per cent nitrogen.

Boil is the great agent and indicator employed in making a heat of steel. It shows the rate at which carbon is being oxidized and eliminated from the metal. It denotes progress either toward or away from the goal.

The composition of the boiling gases undoubtedly changes, as does their volume, as the heat progresses from melting down to finishing, because the percentage of carbon in the metal diminishes, the free oxide of iron in the slag varies and the bath temperature rises.

## Working Out Gases from the Bath

From a soft steel bath, or even one which does not boil because of lack of carbon, large volumes of gas may be dislodged by stirring it gently with a cold steel rod. This gas may be possibly of a different composition from that of the boiling gas. It is likely to be more largely hydrogen than the

**M**OLTEN metal exudes gases, whether in the furnace in which it was made or in the mold in which it is to solidify. In both cases what is driven off is chiefly carbon monoxide (CO). But there is a large amount of hydrogen liberated in many instances, sometimes so associated with nitrogen as to form ammonia. Segregation in steel is attributed largely to the washing effect of escaping gases.

other, but of that we have no knowledge.

Hydrogen seems not to be able to leave the metal by itself, but is probably carried off to some extent by the escaping CO bubbles. This function presumably varies with the bath temperature, for when that is unduly high, hydrogen seems to be retained more persistently in the metal. The power of CO to carry off other gases may lessen as its volume, and hence the intensity of the boil, decreases.

A certain intensity or vigor of boil may be required for any hydrogen to be carried off; that is, the boil must not be too gentle. It is quite conceivable that, with some certain concentration of hydrogen in the metal, and considering (1) the proportions of carbon and gas-solvents present, (2) a certain percentage of iron in the

slag and (3) a bath temperature above a certain point, no hydrogen is eliminated unless the boil has a proper intensity.

As these conditions change, the degree of boil may and probably should need to be changed also for best results in cleaning the metal of harmful gases. A stronger boil than usual may overcome, in some measure, adverse conditions.

The foregoing may suggest some of the reasons why the steel melter wants to give his bath a "good" boil. He wonders what the gases are which leave the molten metal, how much more of them is retained, and what is the effect of the latter on the finished steel.

## Gases Evolved from Molten Steel in the Mold

**A**S the molten metal cools in the mold its power to hold in solution some if not all of its gases lessens, and they consequently tend to escape. They are then evolved in inverse proportion to the percentage of unsaturated gas solvents in the metal; the more of such solvents, the less the gases are set free. The mere presence of solvents is not enough to prevent the escape of gas in the mold. They must be unsaturated, that is, be able to hold more gases in solution than they have, like freshly added aluminum or ferrosilicon.

From freezing steel, not killed, the different gases are evolved in sequence as the saturation point of

each in the molten metal is reached. For some gases that point may indeed be at the freezing temperature, when the solubility of such gases in steel not killed may abruptly become zero, and a part or all of the gases then liberated will form holes in the ingot.

#### How Different Steels Act

Killed steel, containing usually at least 0.25 per cent silicon or equivalent gas solvent, evolves no bubbles of gas in the mold, though a little flame may play over the surface during teeming. The top surface of the ingot quickly freezes over, sealing in any gases which might tend to separate later. Under less than atmospheric pressure—or suction, so-called—and in a gas-tight mold, it is likely that gases would be evolved from ordinary killed steel as it cools, for they are so evolved in increased amounts from other kinds of steel.

Partly-killed steel evolves gas in the mold in quantity inversely proportional to the degree of killing. When nearly killed with, say, from 0.15 to 0.20 per cent silicon added, it acts in this respect much like killed steel and the top soon freezes. With from 0.10 to 0.12 per cent silicon it will rise moderately in the mold during solidification, and escaping gases may raise little volcanoes or "horns" of metal on the ingot top. With less gas-solvent, the evolution of gases and rise of metal in the mold will be correspondingly greater. All of these varieties may roll well enough to give marketable goods, though the top metal will be more or less laminated and seamy from the gas-holes and segregation there.

Rimming steel properly made evolves large volumes of gas in the mold, chiefly carbon monoxide (CO), with probably some hydrogen. This release of gases is an essential feature for making thick-skinned ingots of rimmed steel. Their quantity must be ample to maintain within the rim as it forms a lively churning action of the metal, which dislodges the hydrogen bubbles which tend to attach themselves to the inner wall of the freezing shell, and at the same time must keep the top open so that the liberated gases may escape.

#### Tying Back to the Furnace Boil

A too-weak evolution of gas in the mold may result from and follow a too-gentle boil of the bath in the furnace, due perhaps to insufficient added ore, or too much manganese or other gas-solvent in the metal, or a too-high casting temperature. The metal may then rise unduly in the mold (one inch is too much), before beginning to form a rim and may form islands of

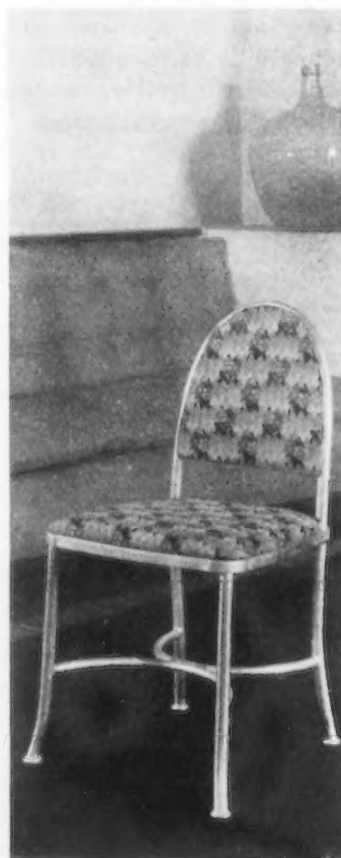
solid metal on top. It is then too late to cure the trouble, and the ingot may be thin-skinned and have too many gas holes located too near the surface, which will or may cause surface defects in the product.

If the outrush of gases is so great that the metal settles later as it cools and the volume of gases lessens, they are too plentiful. But that may be corrected easily even then by the addition of a little aluminum to the molten metal in the mold; one or two ounces in a ton of steel is usually enough. Then, after the steel has settled, more steel may be run in to bring the ingot up to weight. The other ingots of the heat may then be dosed with the same amount of aluminum when they are nearly filled, but not before, as the action can hardly be too strong in the lower half for adequate dislodgment of the skinhole gas bubbles which start to form there.

#### One Cause of Segregation

Segregation seems to be largely an effect of escaping gas bubbles in

**A**TTRACTIVE feather-weight chairs of modern design are made of Dow-metal, a magnesium alloy manufactured by the Dow Chemical Co., Midland, Mich.



the mold which, by keeping the liquid metal in motion, make it wash off and mix with itself the rejected impure matter from the crystallizing steel. Hence rimming steel segregates strongly. Dead steel emits no gas and segregation in it is comparatively slight.

#### Tests Should Be Repeated with Samples of Known History

Determinations have been made of gases evolved from freezing steels, which showed them to be of varying proportions of CO, H<sub>2</sub> and N<sub>2</sub>. CO was usually over half, while the other two averaged near a quarter each. The results are discordant and the determinations must all be repeated with samples whose histories are known.

So far the most important work in this line which has been published is that of Baraduc-Muller in 1913 at the Ougrée-Marhay Works in Belgium. He worked with suction upon basic Bessemer steels containing about 0.10 per cent carbon and 0.57 per cent manganese, his samples weighing half a ton. The one giving the least gas yielded 16½ volumes at atmospheric temperature and pressure, having an average composition as shown in the table.

#### Average Composition of Gas Obtained

Ingredient	By	By
	Volume, Per Cent	Weight, Per Cent
Carbon dioxide, CO <sub>2</sub> ..	3.6	...
Oxygen .....	0.9	...
Carbon monoxide, CO ..	30.5	0.08
Hydrogen .....	52.2	0.01
Methane, CH <sub>4</sub> .....	0.2	...
Nitrogen .....	12.7	0.34
Total .....	100.0	0.124

The total weight of 0.124 per cent for the three important gases was 2.8 lb. per ton of metal. In the first gas to come off there was more CO than H<sub>2</sub>, but after solidification began hydrogen was twice as plentiful as CO. In rainy weather the total volume of gases extracted was about 50 per cent greater than in dry, which increase Baraduc-Muller considered was chiefly hydrogen derived from decomposition of water vapor in the blast.

No aluminum was added to the steel. If it had been, the volume of gas would have been correspondingly less. Much of the value of this work, fine as it is, is lost because the history of the metal is incomplete. The World War, which began the next year, prevented the continuation of the work.

(To be continued)

# Elevated Highways as an Approach to Reconstruction

By WILLIAM E. CROCOMBE

President, American Forge Co.



THESE two great industrial giants, the steel industry and the railroads, work together very closely. Assuming we give the steel giant a big shot of production to bring him back to life—what happens? He stretches a tremendous hand up into the Northwest and reaches for iron ore. Not a few thousand carloads, but hundreds of thousands, and his railroad brother then begins to feel what he needs to restore him to full strength—tonnage. This ore is brought down to Duluth, Superior, Two Harbors; loaded into Great Lake steamers and unloaded at different lake ports.

Some of these ports use the ore direct, but in a great many cases it is reloaded into cars and sent to Pittsburgh, Youngstown, Lorain, Johnstown and other great steel producing centers.

With the other arm the Steel Giant reaches into Ohio, Kentucky, Pennsylvania, Indiana and Illinois for thousands upon thousands of carloads of coal, and the railroads again bring this up to the coke ovens. After the ore and coal, he again reaches out—this time with both arms and gathers from every section of the country hundreds of thousands of carloads of scrap, limestone, manganese, dolomite, fuel oil and other miscellaneous products.

In painting this picture, remember the giant, Steel, is always helping the railroads. Even after the mills turn out their finished product of billets, bars, rails, sheets, and structural material, the railroads are again called upon to deliver practically the entire production.

Where will we find the remedy "production" so vitally needed to restore these giants to their normal activity?—by the building of essential and needed elevated highways. Let us visualize again. This is the Chicago district. Picture a highway starting over the Burlington tracks at Aurora, Ill., and coming into Chicago over the railroad right-of-way over Sixteenth Street and connecting with another elevated highway over the Illinois Central right-of-way clear out to the Lincoln Highway. These two great systems connect with our present wonderful Outer Drive, and another road to be built across Kinzie Street, and then

"OUR two industrial giants, Steel and Railroads, are flat on their backs," says the author. "Something must be done and done quickly to restore them. What do they need? Production and tonnage." To provide them with production and tonnage, Mr. Crocombe presents a plan for the construction of elevated highways in the congested districts of our principal industrial areas.



over the Northwestern tracks as far North as Waukegan. The continuation of our present lake Outer Drive by building an extension from Jackson Park to either Michigan City, Ind., or St. Joe, Mich.—so much for the Chicago district.

Let's take Detroit—an elevated highway stretching over the Michigan Central from Ypsilanti connecting with the Ambassador Bridge, and another one running over the Grand Trunk, for service to Royal Oak, Birmingham and Pontiac, connecting with the Detroit-Windsor Tunnel.

Let us move on to Buffalo and picture another over the New York Central tracks from Terrace Station clear into Niagara Falls; and then continue on to imagine elevated highways in the congested areas of New York, Boston, Philadelphia, Newark, Baltimore, Washington, Cleveland, St. Louis, Omaha, San Francisco, Los Angeles. In fact, every major city in our country either needs elevated highways into and out of their congested areas today, or will need them very shortly.

I hope I have painted this picture clearly enough for steel executives to see the millions of tons of beams, channels, plates, bolts, rivets, and reinforcing bars. Cement plants would have a greatly increased production, and we must not overlook the lumber industry, for millions of feet of material would be necessary for concrete forms. Also copper for electric light-

ing and thousands of tons of piping for sewer connections.

I suppose by this time you are wondering how this is going to be financed. First: by the formation of a nationwide organization called the "National Elevated Toll Highway System." Second: by a nation-wide drive similar to our Liberty Loans to aid in the sale of three billion dollars' worth of National Elevated Highway Bonds. In this portrait we are painting there is no room for Shylocks who are looking for from 12 to 30 per cent on their money, for these bonds would bear a rate of interest not in excess of 4 per cent with necessary sinking fund requirements.

How do we get the income to pay the interest and sinking fund requirements? By the payment the users of these different elevated highways make—a certain toll of charge to cover the cost of operation, repairs, interest and sinking fund requirements. In other words, the same system that has worked out so well in the building of the Holland Tunnel, the George Washington Bridge, the Storm King Highway Bridge, and other successful toll projects.

This method of financing and charging direct tolls would relieve the taxpayer from any further burden in regards to increased taxation—something that has not been done in connection with somewhat similar plans to relieve the present depression.

Several bankers to whom the writer has talked regarding this plan say that the bonds could not be sold at the present time owing to present market conditions. Remember, this is just as much a patriotic project as the World War when we raised from fifteen to twenty billion dollars by the sale of Liberty bonds to help destroy human and material values. I am firmly convinced that we could sell at par for this project of reconstruction the three billion dollars of bonds necessary for the awakening of the two industrial giants.

One thing more about financing. The writer, during the past two years, has worked with the Iron and Steel Division in Cook County raising funds for charity relief. In 1930 we raised over \$6,000,000, in 1931 slightly over \$10,000,000. If we don't wake up



these giants in 1932 it will be \$20,000,000 and increase each year. This was only the Chicago area and the total for this needed relief over the entire country must have reached staggering figures. Where did we get all this money? It was given away by corporations and individuals—not invested, but given away, and I firmly believe that bonds bought under this plan would not only eliminate the bulk of money for these charity drives, but relieve unemployment by the creation of a new major industry.

Let us go back to the Railroad Giant. I believe that some system of mileage could be worked out to reimburse the railroads for the air rights

over their right-of-way. This will increase their revenue, and they would also receive the right to operate or lease any passenger bus privileges on these highways. Elevated highways covering railroads' right-of-way would necessitate, I believe, the electrification of tracks running underneath, such as the Pennsylvania System and the New York Central running into New York City. The expense in connection with this major and important undertaking, I believe, should be borne by the National Elevated Highway Systems, and they to be reimbursed by the railroads from a portion of the air-right receipts until this account is fully paid.

Let me summarize: We have all the material for a great picture. We need a great artist to mold it into life—an empire builder, a Jim Hill, a Hariman, a Huntington, or a Roosevelt. We can get millions that will tell how and why it can't be done, but we are looking for the very few who say *it can be done—and then do it*. Remember again, we have no room in this picture for Shylocks—we want executives who are willing to work like first helpers making bottom on an open-hearth furnace, or second helpers sledging out a frozen tap hole.

After all, every picture should have a name. Let's call this one "The Highway to Prosperity."

## Automatic Annealing Box Carrier

**T**HE continued quest to reduce sheet and tin-mill operating costs in every department has led to the development of the motor driven annealing box carrier, here illustrated. Intended primarily to reduce crane follower cost, the motorized carrier has the added advantage of providing security against slippage. Premature

opening of the hooks is prevented through the use of self-locking worm and worm-wheel actuating apparatus, which when properly set cannot slip open and drop the load.

This safety feature is of particular importance in tin mill annealing departments, where the product is being transported over cold rolls and in ex-

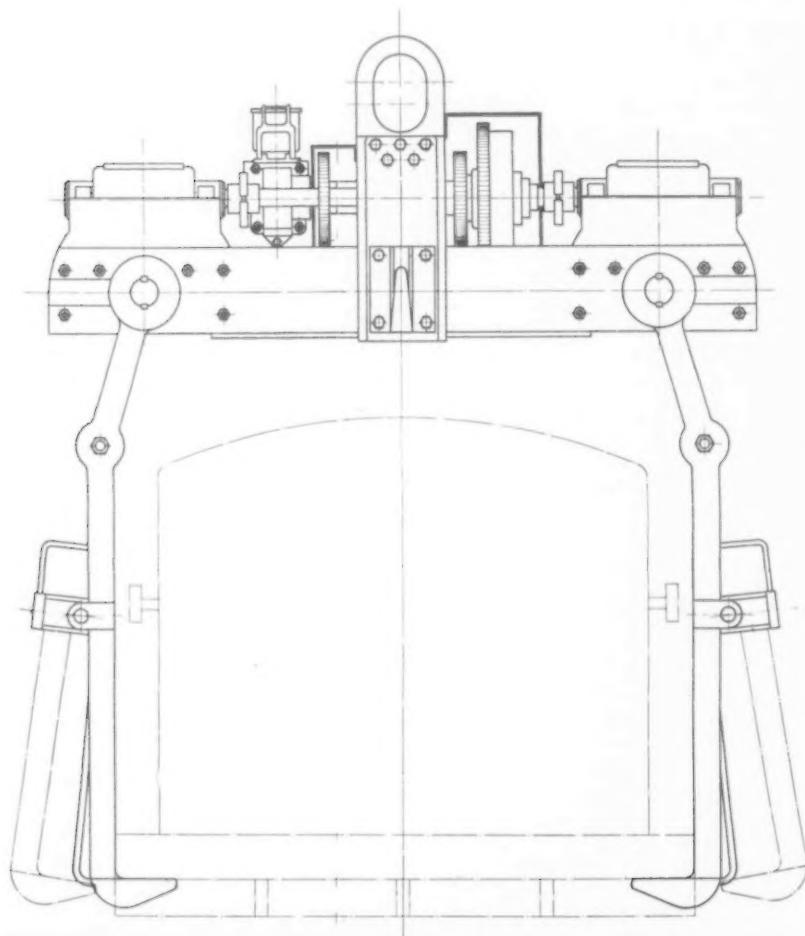
aming departments where workmen are continuously engaged. The design of the machine makes possible control of the hooks from the crane cab and requires only one hooker-on for satisfactory operation.

Operation may thus be described: Assuming an annealing furnace is about to be charged, the single hooker guides the opened grab hooks into place between the lugs on the annealing box bottom, and the grab hooks of the carrier are properly aligned. The crane operator closes the hooks by power from the crane cab and the mechanism latches automatically. The crane then deposits the annealing box in position on the furnace charger, releasing the hooks automatically without the assistance of a follower or hooker, and returning to the location of the next box to be spotted, where the hooker again guides the carrier into place.

When unloading the charger following annealing, the cycle is carried out in a reversed manner; thus, one crane follower may be substituted for the three formerly required.

Carriers of this type are in operation in the plants of one of the large producers where the equipment was developed. Carriers of similar construction can be used for handling sheets, tin plate, strip steel and at all other places where hand operated carriers have formerly been used. The carrier is obtainable from the Wean Engineering Co., Inc., Warren, Ohio, which has acquired the license to sell it.

Sharon Steel Hoop Co., Sharon, Pa., is installing a sheet normalizing furnace of the McCann walking beam type. The furnace is being constructed by the Rust Engineering Co., Pittsburgh, and its associate company, the McCann Engineering Corp. It will be fired with natural gas and will have automatic temperature control.



Annealing box carrier is motor operated from the crane cab and besides promoting safety dispenses with two crane followers.

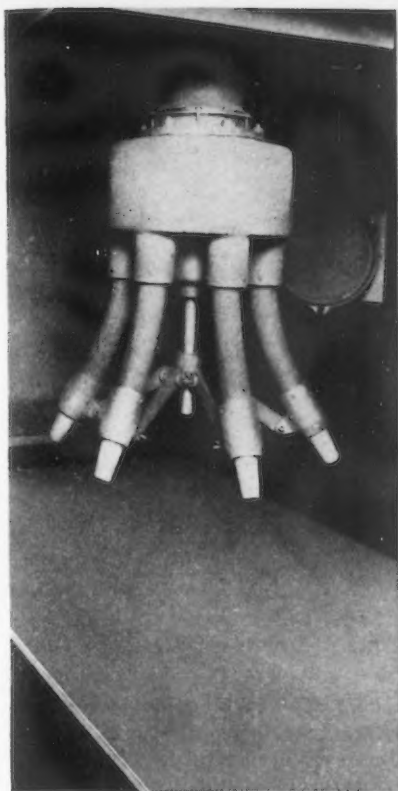


FIG. 1—Sheet to be cleaned is passed underneath a rotary gun equipped with Carbonyl nozzles and revolved at high speed.

# SHEET STEEL CLEANING BY ABRASIVE BLAST

By L. D. PEIK

Chief engineer,  
American Foundry Equipment Co.,  
Mishawaka, Ind.

THE application of abrasive blast in surface preparation of miscellaneous metal products illustrates concretely how the coordination of suitable methods of materials handling, blast gun selection and the utilization of proper abrasive has led to production efficiencies which have proved the wisdom of investing in such equipment.

It is not believed that abrasive blast cleaning will entirely supplant pickling. Also, much remains to be done along the lines of heat treatment and break-down practice (as in the sheet rolling mill) to eliminate, in a large measure, the objectionable scale and slag before any real cleaning comparisons can be made. Very heavy scale is usually found on bars and break-downs in the sheet mill, and unless steps are taken to remove this it will be rolled into the surface during the hot rolling of the sheet. If scale is removed from the bars, subsequent cleaning will be, no doubt, easier. Care must be taken, of course, that the bars be not exposed to oxidation more than necessary.

Sheets of light gage, rolled from thin bars, may very effectively be

cleaned by minimizing embedded scale in the bars. In sheets of heavy gage, rolled from thick bars, effective elimination of embedded scale is only accomplished by cleaning the break-down. Automobile grades of sheets are usually made from cleaned break-downs and are inspected for defects which would mar or discolor the sheet surface.

Common blue and box annealed sheets may show greater loss from abrasive blast treatment than the normalized pickled break-downs and chrome steel of open anneal, the ratio

being about two to one. The loss on several sheets from normalized pickled break-downs showed an average of 0.6 per cent. Abrasive blast on blue annealed sheets did not entirely remove the deep discoloration.

The particular method of rolling break-down or heating and annealing in the sheet mill industry is just a little different in every plant. This being the case, it is reasonable to assume that the sheet surface conditions present an individual problem, or it may be said that no standard at pres-

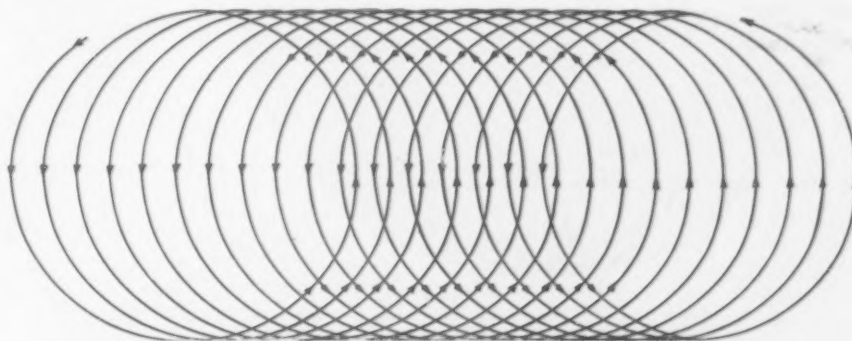


FIG. 2—The diagram describes the path of the blast from only one of the six nozzles.



Fig. 3

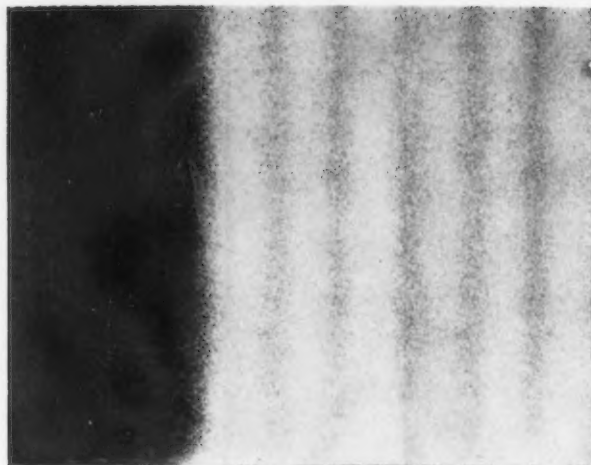


Fig. 4

How the surface looks when cleaned with the rotary gun is shown in Fig. 3, while the effect of a stationary gun, somewhat exaggerated to prove the point, is shown in Fig. 4.

ent exists on which to base production or costs.

#### Comparative Cleaning Tests

Galvanizing experiments recently made resulted in the following data, abrasive blast versus pickling sheets with respect to cleaning loss and coating with zinc:

There were two groups of No. 26 gage sheets (each group consisting of five sheets) used in these tests. All ten sheets were resquared to 28×108 in., before beginning the test. The loss in weight was as follows:

Due to pickling .....4.3 per cent  
Due to abrasive blasting ..3.7 per cent

Coating, based on sheets before and after coating and on sheet area coated, gave these results:

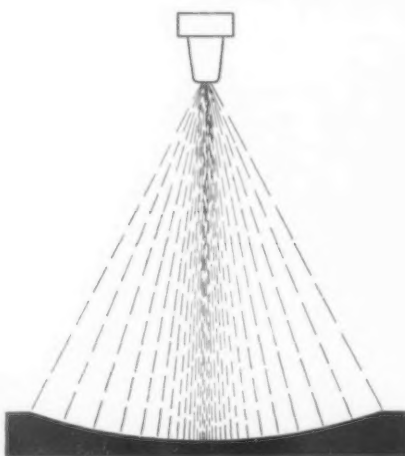


FIG. 5—Use of a stationary nozzle is found to produce a camber and to harden the surface slightly.

Pickled sheets .....0.95 oz. per sq. ft.  
Abrasive cleaned sheets,  
1.30 oz. per sq. ft.

The pickled sheets were good in appearance, spangles were large, but adherence of coating poor. The coating peeled from the pickled sheet when run through forming rolls.

The abrasive cleaned sheets had some black spots showing through the coating, although this was not always visible unless a close inspection was made, but coating adhered firmly when run through forming rolls.

#### Apparatus Described

The abrasive blast performance was based on results of a newly designed rotary gun operated at very high speed, the head of which contained six nozzles of Carbide, as shown in Fig.

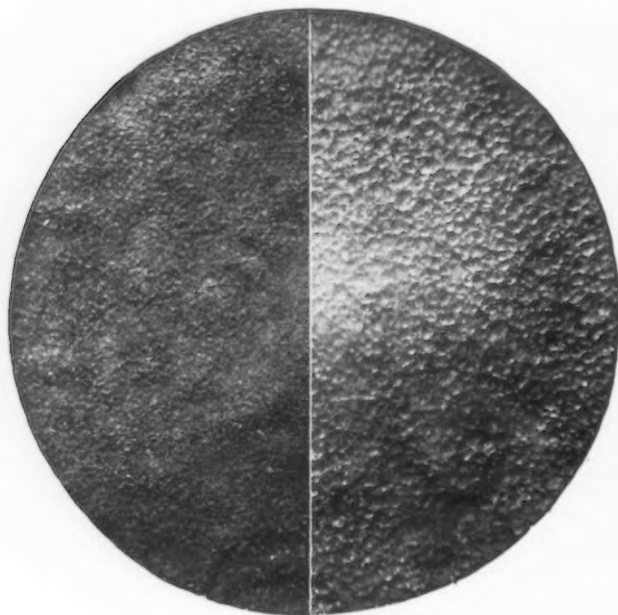


Fig. 6

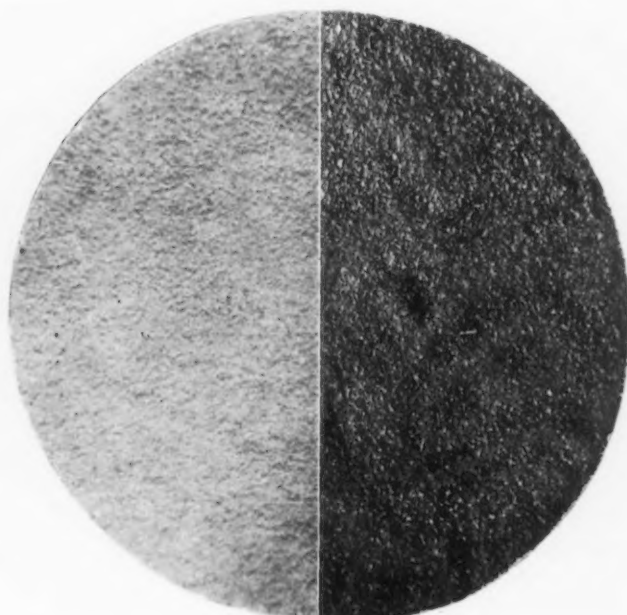


Fig. 7

FIG. 6—Steel round shot used as the abrasive in the rotary gun has a peening effect, as shown on the right half, while the results of using steel grit is shown on the left. Fig. 7—Sand was used on the left and steel grit on the right.



1. The nozzles are mounted in flexible tubes extending from a rotary head and may be set for sheets varying in width from 12 to 56 in. The path scribed or covered by the blast is illustrated by Fig. 2. This particular diagram shows the path followed by a single nozzle in a rotating head. The coverage, of course, is made denser by six nozzles following close to each other at high speed. The appearance of the surface cleaned is shown in Fig. 3, while that with stationary guns, somewhat exaggerated to show the effects, is shown in Fig. 4 and in Fig. 5.

Passing sheets under a group of stationary nozzles tends to produce a camber. This also has the effect of hardening or tempering the surface slightly. This effect is greatly minimized by the use of a high speed rotary head gun because the entire width is intimately covered by the blast instantly and very uniformly. The nozzles tend to scour rather than to produce an impact to cut a groove. It will be observed in Fig. 3 that the surface is attacked from the two sides by the rotation of blast nozzles, which, it is believed, contributes to the efficiency of this method.

Careful consideration must be given to the type of abrasive used in blasting. Steel grit of 30 mesh, which can be advantageously used in blasting gages heavier than No. 10, is not possible on lighter gages because of the peening effect it would produce. Steel grit of 50 mesh and finer are recommended for the light gages. Thirty mesh sand of good hard quality has been used with considerable success, but the lasting quality of sand is comparatively short.

Steel round shot even of very fine

mesh has but little cutting quality; its peening effect is pronounced. Fig. 6 illustrates appearance of shot blast surface on the right half of circle and grit blast surface on the left.

Fig. 7 illustrates the comparison between sand and steel grit. Sand is shown on the left, grit on the right. Note that the sand produces a lighter color and a smoother finish.

In purchasing equipment, consideration should be given to the question of whether the operation is to be continuous or intermittent. Batch production may be so arranged that continuous cleaning over a period of hours is not necessary. This method would require less costly equipment.

For continuous blast service an automatic continuous operating machine was devised as shown on Fig. 8. Abrasive is constantly fed to the blast gun head under high pressure. The abrasive is conveyed through an air lock system, as indicated by the upper and lower chamber immediately over the rotary gun. The nozzles used are made of Carboloy and will maintain a constant orifice opening over a period of 200 hr. or longer.

The elements necessary for abrasive cleaning, described above, are used in connection with a dust-sealed, sheet metal cabinet, rubber lined, to which a dust arrester and an exhaust fan is connected. The work is fed through the cabinet on power-driven rolls at a predetermined rate of speed.

Through development and research by abrasive blast engineers, with the help of the rolling mill engineers, this method of cleaning sheets, bars, and shapes has been made entirely practical and offers some distinct advantages for the user.

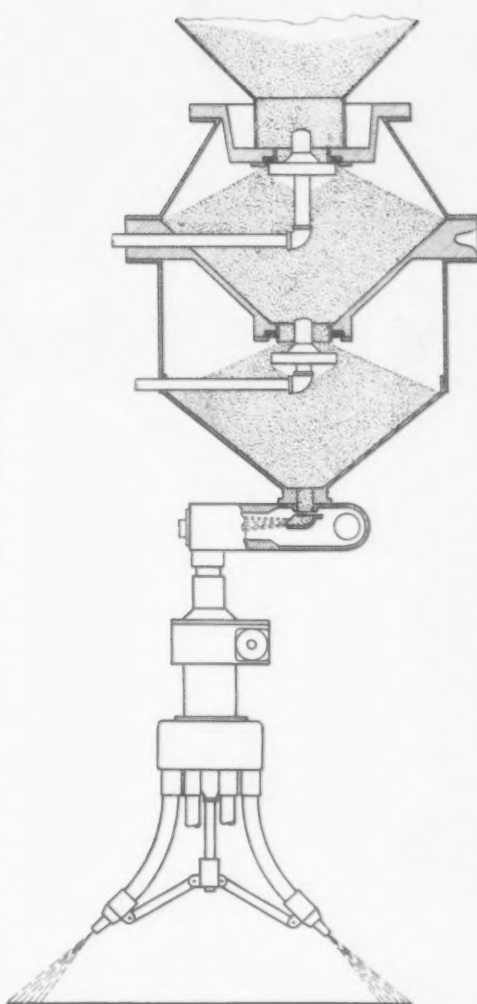


FIG. 8—The automatic continuous operating machine includes an air lock system.

## Methods for Determining Gases in Steel Studied

THE different methods which have been proposed for the determination of oxygen, nitrogen, and hydrogen in steel have been studied at the Bureau of Standards, and are discussed in some detail in a paper "Determination of Oxygen, Nitrogen and Hydrogen in Steel," presented at the annual February meeting of the American Institute of Mining and Metallurgical Engineers in New York.

In the determination of oxygen, no one analytical method yields complete information, says the author, J. G. Thompson. Residue methods, including electrolytic methods, determine certain insoluble constituents but

fail to determine more soluble ones. Hydrogen reduction methods are practically limited to the determination of FeO. Macroscopic and microscopic methods are limited in their application. The vacuum fusion method determines the total oxygen content of many steels but does not distinguish the forms or combinations present. Any of the methods may be of value for comparison of like materials, but complete information, if it can be obtained at all, ordinarily comes only from a combination of two or more of the methods.

In the determination of nitrogen, satisfactory results usually can be

obtained by either of two methods, the solution-distillation method and the vacuum fusion method, according to Mr. Thompson. If appreciable amounts of nitrogen are present, either in uncombined form or combined in the form of certain refractory nitrides, the vacuum fusion method will recover more nitrogen than the solution-distillation method.

Hydrogen is rarely encountered in ferrous materials in amounts in excess of about 0.001 per cent and its determination, therefore, generally is considered unnecessary, concludes the author. It can be included in a vacuum fusion determination.

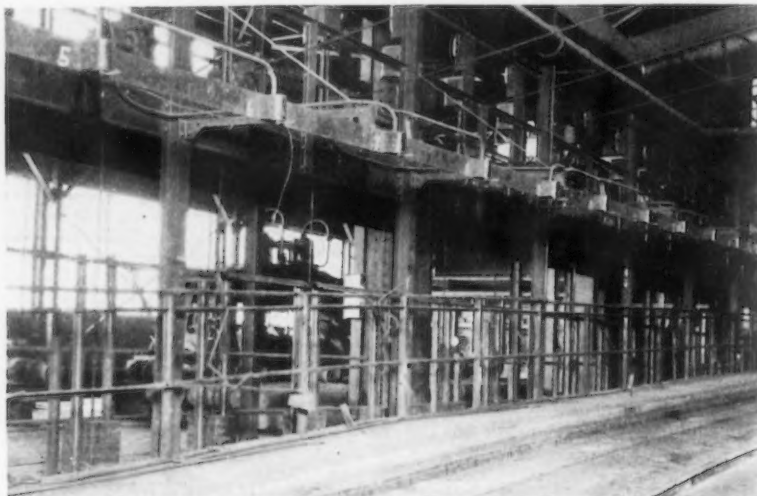
## Opens Furnace Doors Electrically

A METHOD of opening furnace doors electrically, such as the doors to furnaces for heating forging blooms and ingots, has been developed by the Reliance Electric & Engineering Co., Cleveland. The driving unit consists of an induction motor espe-

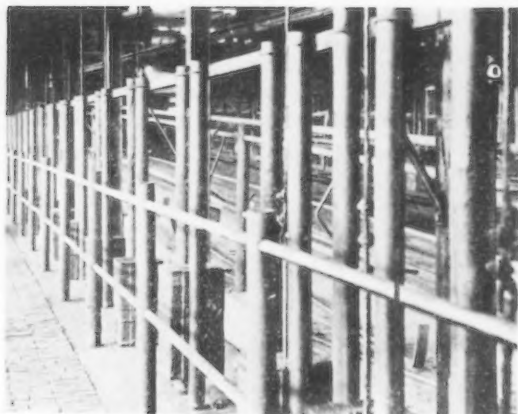
reducer is provided with a heavy sheave and a similar sheave is placed above the furnace door. A heavy cable attached to the door passes over the sheave above and then extends to the other sheave, around which it is given a turn, and thence

tions a spring-return drum switch is used instead of push buttons. Holding the switch to one side opens the door, and holding it to the other side closes the door.

A low-voltage pilot circuit is used between the push button and the starter, and the danger of high-voltage power circuits near the operator is removed. Should the operator keep the push-button depressed



ABOVE is a line of the speed reducers, driving motors and control apparatus. Below may be seen the counterweights. Two pipes are used as guide posts for each weight. The weights on opposite sides are grooved to fit loosely partly around the pipes.



OPPOSITE the line of furnaces and on a platform about 8 ft. above the floor are arranged the driving units, and in the space underneath are the weights for counterbalancing the doors. Spring-return drum switches are mounted on a steel rail paralleling the platform and supporting them above the operating floor, the pendent ropes for pulling the switches being shown in the picture.

cially designed for the purpose, coupled to a speed reducer. In the case of the installation here illustrated, all the units are located in the building bay opposite the line of furnaces and therefore at a considerable distance and protected from high temperatures and any likely injurious conditions in the proximity of the furnaces.

The driving units are mounted overhead so that plenty of space is available for counterweights to balance the furnace doors. Each speed

drops to the counterweight below. Other sheaves are necessary only where there are obstructions to be passed.

By counterweighting the door, the work of the driving unit is merely to change positions. Pushing a button opens the door and pushing a second one closes it. The operation proceeds only while the button is depressed; the door may thus be opened to any point desired and it will remain stationary until one of the buttons is again depressed. For some installa-

after the door has reached either limit, either the door or the counterweight will rest on the bottom, and the grip of the cable around the driving sheave will be relieved and the cable will slip on the sheave and no damage will occur. In other words no limit switches are required.

C. L. Peterson, of the Reliance company, says the upkeep has proved to be practically nothing more than providing periodic lubrication, there being no intricate mechanisms in the equipment. He adds that the average door may be opened or closed in 5 seconds.

Ohio Foundries Association will hold its first sectional meeting for 1932 at Hotel Gibson, Cincinnati, March 13. One of the main subjects to be considered will be accident prevention, which will be discussed by George Seiler, Lunkensheimer Co., Cincinnati. The meeting will start with a 6 o'clock dinner. R. J. Redmond, Buckeye Foundry Co., Cincinnati, is in charge of the program and Charles C. Erhart, Chris Erhart Foundry Co., Hamilton, Ohio, are in charge of arrangements.

## Low Friction Loss Features New Oil Flooded Roll Neck Bearing



**M**ARKED saving in power, high strength capacity, and facilities for quick roll changing are emphasized by the Morgan Construction Co., Worcester, Mass., in announcing its new Morgoil "sleeve-type" roll neck bearing. Of fully inclosed construction, this bearing is designed to receive oil from a circulating-filtering system. Oil at high pressure is not required, so that any standard oil circulating system now in use at the mill may be employed.

Instead of using the roll necks proper as journals, this design employs accurately made sleeve journals in the unit construction, and when changing bearings the entire bearing unit, including the sleeve journal, is removed intact. Removal of the bearings is facilitated by the use of roll necks having a slight taper. Bearing surfaces are completely protected at all times, and cannot be injured when changing bearings from one roll to another.

The design is such that roll necks up to 70 per cent of the roll barrel diameter can be used. The necks join the roll barrel through fillets of very large radius, and this, together with the absence of shoulders or grooves in any vital part of the neck, gives very low stress concentration factors.

Quickly-detachable hose fittings are provided for connecting both the supply and the return lines of the oil circulating system. The oil is sealed against escape, and water or scale cannot enter the bearing.

Endwise adjustment of the bearing is accomplished from one end of the roll. The unit assembly at that end contains a complete thrust bearing. On the opposite end of the roll the bearing is free to float endwise within limits, thus allowing for the free expansion of the roll barrel.

### Friction Coefficient Very Low

The coefficient of friction of the Morgoil bearing ranges from 0.0018 to 0.004, depending upon the viscosity of the oil and the speed of rotation. The friction heat generated, carried away by the circulating oil, is said to be negligible, and water cooling, therefore, to be unnecessary. Marked savings in power are attributed to the low friction coefficient obtained by separating the metal surfaces of the journal and the bearing by a definite film of oil. As against ordinary plain

babbitted roll neck bearings, it is said that the saving in power will vary in each case, according to the proportion of total power absorbed by the ordinary bearing, the friction coefficients of which are said to range, by test, from 0.04 to 0.12, depending upon the load and speed conditions. In cases where neck pressures and speeds are high, the savings in power will be greatest.

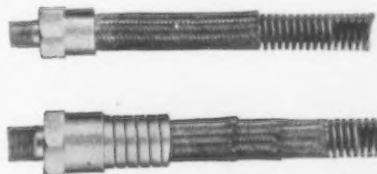
Capacity of the Morgoil bearing for carrying heavy pressures is also high, and it increases with the speed. It is stated that the bearing will carry loads up to the breaking point of rolls having full sized standard necks without damage to the bearing and without breaking down the oil film. This is said to have been amply demonstrated by tests, in which the rolls actually broke with no damage sustained to the bearing.

## Flexible Metallic Tubing for Industrial Uses

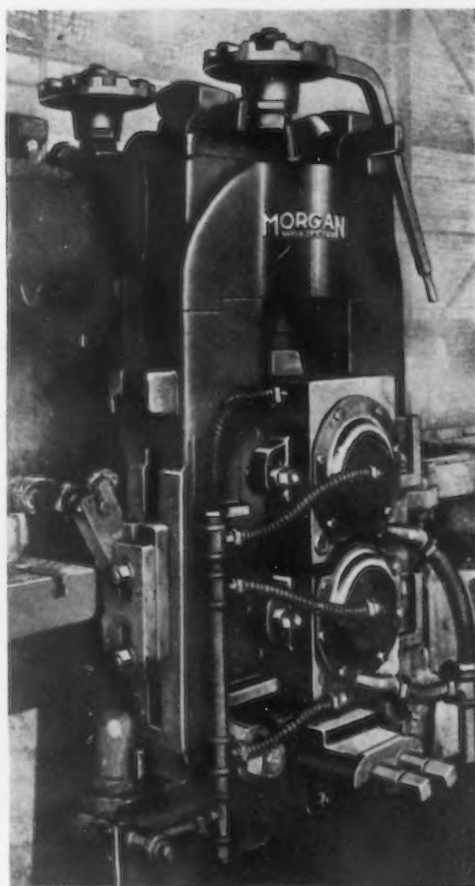
**S**EAMLESS flexible metallic tubing for a wide variety of industrial applications, including machinery applications, is being marketed by the Bendix Stromberg Carburetor Co., subsidiary of the Bendix Aviation Corp., South Bend, Ind. It is claimed that this tubing has withstood pressure of 10,000 lb. per sq. in. and temperatures in excess of 500 deg. F.

The tubing is seamless from the tip of one fitting to the tip of the fitting at the opposite end, the fittings being brazed or welded to form an integral part of the tubing, a construction emphasized as preventing the development of leaks and breaks between the hose and its fittings.

Made of bronze alloy seamless pipe, the tubing is corrugated in round-



In addition to the braided copper, a galvanized steel casing can be furnished.



Strip mill equipped with Morgoil roll neck bearings, which are fully inclosed and are oil flooded.

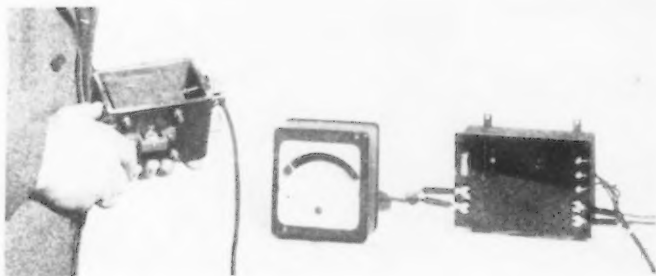
thread single-lead deep wall form. A protective casing of braided copper is applied in one, two or three layers, according to the pressure the tubing is to withstand. As a protection against mechanical damage to the braid covering, as well as to distribute the flexing action, the makers recommend use of an interlocked, unpacked galvanized steel casing overall. Six sizes of the flexible tubing, from 3/16 to 1 in. internal diameter, are now manufactured.

## Flanged Valve Standard Released for Criticism

**A** PROPOSED American Standard giving center-to-center dimensions for three kinds of ferrous flanged valves—wedge gate valves, globe valves, and angle valves—has been released for general comment by the American Standards Association, 29 West Thirty-ninth Street, New York.

The proposal covers wedge gate valves in sizes from 1 to 24 in. O. D. (cast iron, for 125 and 250 lb. steam pressure, and steel, for steam pressures of 150, 300, 400, 600, 900, and 1500 lb.); and globe and angle valves in sizes from 1/2 to 8 in. (cast iron for 250 lb. steam pressure, and steel for steam pressures of 300, 400, 600, 900, and 1500 lb.).





## Electric Micrometer Applied to Measuring Vibration and Strain

VIBRATIONS in turbines and other machinery are measured in thousandths of an inch by the vibration detector developed recently in the general engineering laboratories of the General Electric Co., Schenectady. Described as somewhat like the seismograph, for recording earthquake tremors, this vibration detecting device is an application of the electric micrometer. A pressure detector and a strain gage employing the same principle have also been developed.

Within the case of the vibration detector, which is bolted to the machine under investigation, there is suspended a block of lead. Two tension springs on the top and four springs on each side of the weight hold it in position. The outside shell of the detector vibrates at the same period as does the machine to which it is attached, but the lead weight, because of its mass and low natural frequency, remains fixed in space.

In the lead weight are embedded two coils, on opposite sides. In front of each coil is an adjustable piece of magnetic steel, fastened to the outer shell. The coils in the weight are energized by 500-cycle alternating current, and the air gaps between the coils and pieces of magnetic steel are adjusted so that the two coils are electrically balanced, the amount of current through the coils depending on the distance of the steel pieces from them. There is, then, a zero reading of the indicating instrument when there is no vibration.

Vibrations of the machinery to which the detector is attached cause a swaying of the outer shell of the

▲ ▲ ▲  
UPPER view shows lead weight of the vibration detector; view at right shows detector in use in testing a machine.  
▼ ▼ ▼

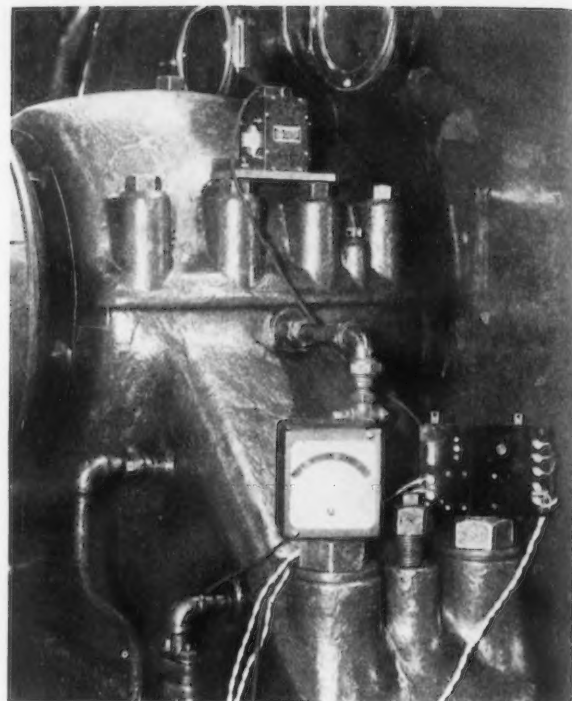
instrument, and therefore varying distances between the coils and the magnetic pieces. These differences cause a variation in the flow of the 500-cycle current, differences that, in the indicating or recording instrument, are translated into thousandths of an inch in vibration readings.

The pressure detector is somewhat similar to the device described. A small case inclosing one such coil, and with the magnetic piece as a diaphragm just beyond it, is threaded so that it may be screwed to the vessel containing the gas or liquid. A similar unit is used as a dummy for the calibration of the circuit.

Variations in pressure cause movements of the magnetic diaphragm and therefore changes in the readings of the instrument. Low pressure changes are subjected to the diaphragm direct for measurement; higher pressures, up to 2000 lb. per sq. in., are recorded by the use of cylinders and pistons.

If the diaphragm of the testing unit is replaced by a ribbon diaphragm to which is attached a feeler rod, the device can be used as another type of vibration recorder.

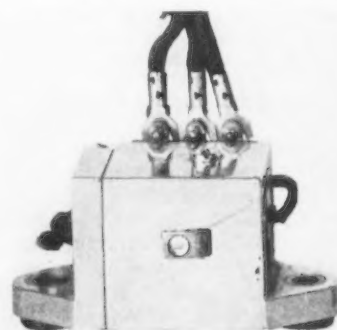
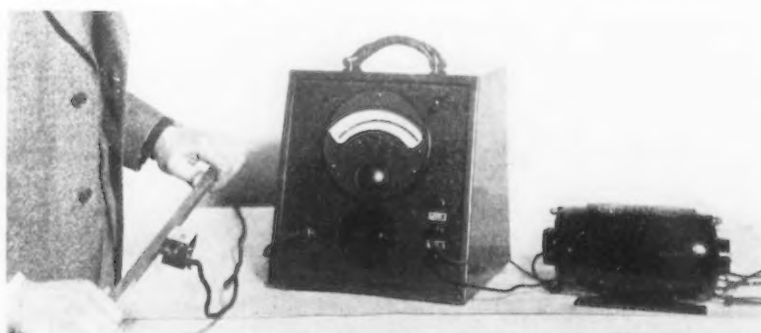
The test unit is held in the hand so that the feeler rod rests against the



vibrating member. The detector circuit is such that a variation in pressure exerted on the diaphragm by the hand does not interfere with measurements as low as five cycles per second. Such a detector was used recently in investigating the vibrations of a new all-electric ship.

### Gage for Measuring Strains

Still another adaptation of the electric micrometer principle is a gage for measuring strains in railroad tracks, bridges and other structural members under load. The gage, with a 2-in. expansion between the mounting holes, can be bolted or clamped to the piece under investigation. The coils are mounted in cylindrical holders which slide inside the block. The block and armature are fastened to one side, and the coils to the other side. A 2000-cycle excitation current is used with the gage, thereby making it possible to record with an oscillograph transient strains which occur in a fraction of a second. A steady strain can be observed on an indicating instrument, using a 60-cycle excitation for the coils.



MEASURING the strain in a bent bar. The gage (above) can be bolted or clamped to the piece under investigation.

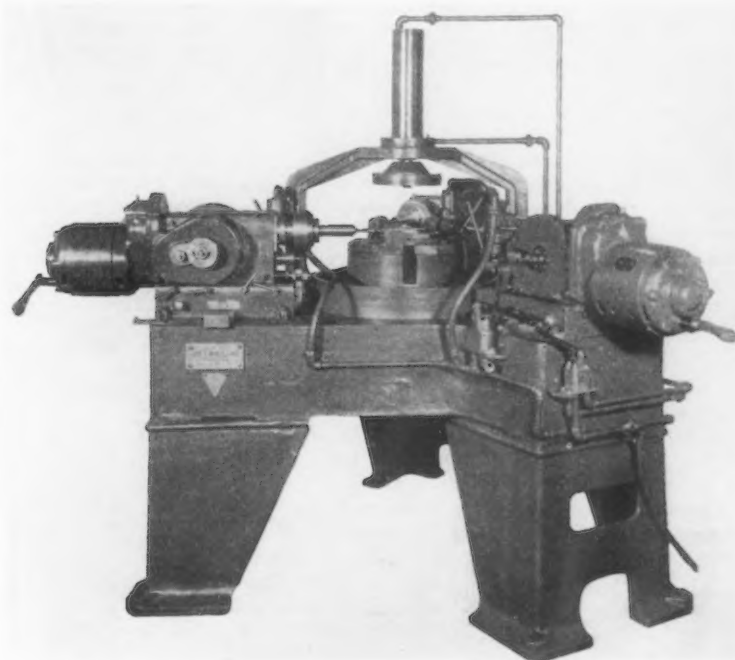
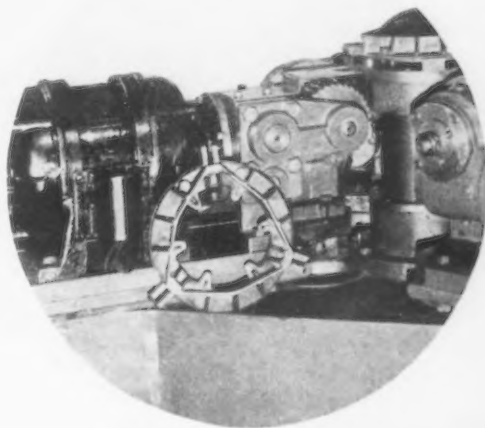
## New Machines Lower Production Time in Milling and Drilling Clutch Plates

**T**WO new machines developed by the Millholland Corp., Indianapolis, for milling and drilling automobile clutch plates, respectively, are here shown. One of them straddle mills three ears simultaneously without indexing the piece, and the other drills and reams three pin holes simultaneously without indexing. Greater accuracy and lowered production time are claimed.

The milling machine has three motor-driven milling units placed 120 deg. apart on circular bed, these units being adjustable on the bases to accommodate larger pieces. A 10-in. air cylinder extending down into the bed maintains a constant pressure at all times on the lower plunger and provides the pressure against which the cam on the No. 5 Millholland automatic unit clamps the piece and feeds it down past the three sets of straddle milling cutters.

Operation of the machine is as follows: The operator places piece to be milled in approximate position over

feeding unit permits the upper plunger to rise 4 to 5 in. farther to open up the fixture and allow a new piece to be loaded. All the operator has to do is load and unload the fix-



the nest pins on the locating fixture on top the lower cylinder. He then actuates the air control valve to engage the feed on the cam-driven unit. The upper plunger comes down at rapid traverse until the feed is cut down to correct cutter feed. At conclusion of the feeding stroke the cam on the feeding unit permits withdrawal of the upper plunger, with the lower plunger following and maintaining pressure. At the top limit of the lower plunger travel, the cam on the

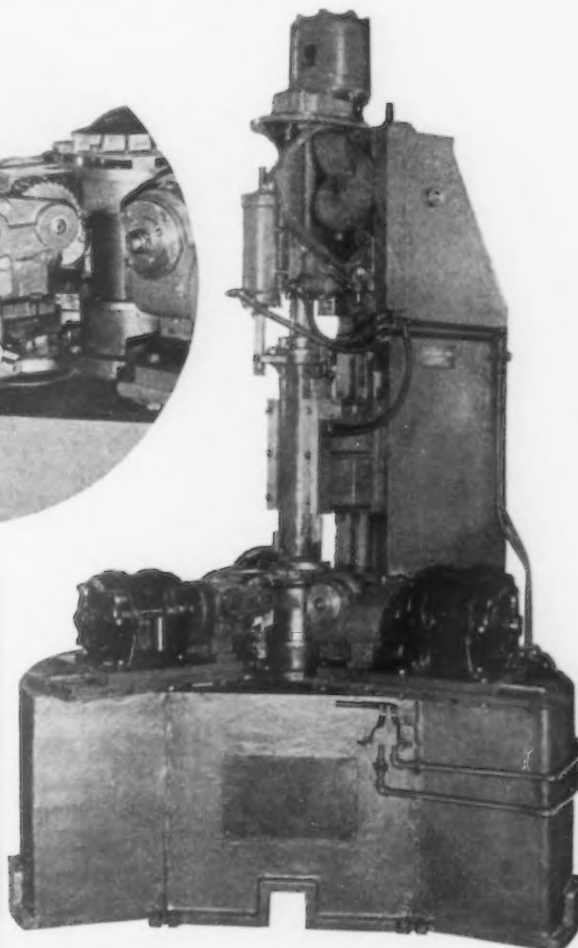
ture; he neither clamps nor locates the piece.

The bed of the machine is equipped with three chip funnels, one directly under each cutter; these connected with large pipes that lead through the bed to openings in the back, the chips flowing out by gravity to chip boxes in the rear.

Cutter adjustment is provided for by means of a hollow spindle in which the cutter arbor is carried. A single spacing collar back of the shoulder on

the arbor provides for sidewise adjustment of the group of three cutters. Cutter speed changes are obtainable through the pickoff spur gears in the spur and worm drive to the milling spindle. Length of stroke or rate of feed can be accomplished by change of cam or of pickoff gears on feeding unit.

The drilling machine, also illustrated, is made up of three No. 3 Millholland automatic drilling units, each



**T**HE special machine for straddle milling simultaneously the three ears on the clutch plate in the insert is shown above. Accurate spacing of holes is obtained on the special drilling machine at left.

equipped with combination drill and reamer. One air valve engages the feed on all three drilling units simultaneously after the piece has been clamped by air plunger. Extreme accuracy of spacing is obtained by this method, as the piece does not have to be removed from machine to be reamed, and even stepped holes can be drilled and reamed accurately.

To permit moving the unit dovetail bases into position for larger pieces, the bases are mounted on large flat keys, with bolt holes drilled in the base for approximate new locations. A spacer bar provides accurate location, after securing which the bases are tightly bolted down in the new position.

## Bulk Acid Storage in Steel Tank Offers Cost Saving

WITH saving in production costs a factor of paramount importance to the metal producer and manufacturer, bulk buying and storage of sulphuric acid for pickling offers an economy for those who have been accustomed to supply acid requirements in the glass carboy.

About 40 per cent is the estimated saving in cost of sulphuric acid when a tank car load is purchased, and a car may range from 4000 gal. minimum to 6600 gal. in a 50-ton car.

The cost of constructing an acid storage tank of the capacity and design shown in the illustration is placed at \$1,200. As concentrated sulphuric acid does not attack iron or steel unless diluted,  $\frac{1}{2}$ -in. steel plates without special lining may be used.

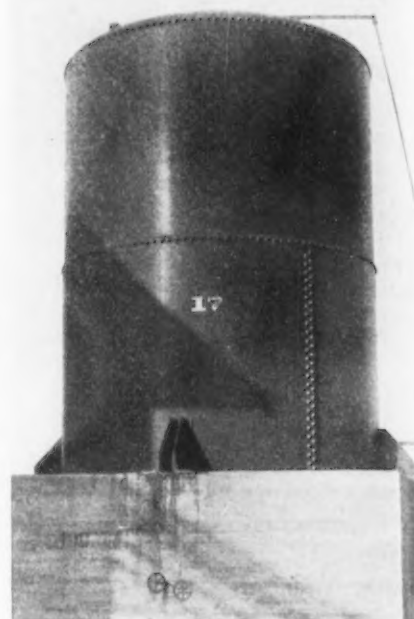
This 10,000-gal. tank is 10 ft. 6 in. in diameter and 16 ft. in height. Heads are dished outward and vertical seams of the shell are lap-joint, double-riveted. As an additional precaution against leakage, all seams are welded on the inside and beveled and caulked outside.

The tank is supported on a concrete foundation by four structural steel brackets, with 14 x 18-in. bearing plates designed to carry the full weight of the filled tank. On top, there is a 24-in. manhole with a flanged edge, loose cover, held by four bolts. Also on top are a 1-in. vent, a 2-in. pipe opening for the filler line and a stuffing box.

A steel ladder on the side leads to the manhole. All piping is double extra heavy and fittings are of forged steel. The entire structure is painted with three coats of acid-resisting paint.

The draw-off line has a valve underneath the tank with an extended handle to be used in closing the line near the tank, and an extra valve near the end of the drawoff is for regulating the flow. As an additional safety measure, an alumite rod with a steel plug passes through the stuffing box and has a quick-closing handle with an adjustable counterweight.

The tank is filled from the top with a 2-in. overhead filler pipe. It is not



Riveted and welded 10,000-gal. tank for storing acid.

necessary to install heating coils, as sulphuric acid has a freezing or cold test of minus 20 deg. Lead pails are used for handling the acid from the tank.

## Metal Cleaning Unit Degreases with Vapor

A "VAPOR DEGREASER," a metal-cleaning unit developed by Carrier-Brunswick International, Inc., division of the Carrier Engineering Corp., Newark, N. J., is being used in the plant of the International Silver Co., Florence, N. J., to remove tempering oil from stainless steel knife blades. Cleaning of the metal parts is accomplished by condensation of the vapor rising from boiling Cecoline (trichloromethane) in the bottom of the tank.

The vapor rises in the tank to the level of water-cooled condenser coils on the sides, about 6 in. from the top.

It then condenses and returns in liquid form to the bottom of the tank. As Cecoline has more than three times the density of air, there is no tendency for the vapor to overflow the tank. Metal parts to be degreased, such as stampings, die castings, bolts and nuts, metal furniture parts and hardware, may be placed in a wire basket and suspended in the vapor. As it rises, the vapor begins to condense on the colder surface of the parts and in running off carries with it grease and oil.

Depending upon the weight and gage of the metal parts being cleaned, they reach the temperature of the vapor in  $\frac{1}{2}$  to  $1\frac{1}{2}$  min., when they may be withdrawn cleaned. As the solvent, Cecoline, has a much lower

boiling point than the grease, oil and other impurities to be washed from the metal, it is claimed that only the pure vapor is continually rising from the bottom. The unit illustrated occupies floor space only about 3 x 5 ft. Larger types are furnished in special designs adaptable to large continuous conveyors and heated by steam, gas or electricity.

## Molding Machine Features Rapid Operation

THE Osborn Mfg. Co., Cleveland, has brought out a new jolt squeeze stripper molding machine designed to provide continuous high-speed operation, with low maintenance cost and a minimum of non-productive time in changing from one pattern to another. The machine is adaptable to a wide range of flask sizes and types of patterns.

The post-type squeeze head support requires practically no floor space; it has few moving parts and operates easily. The supporting column contains two widely-spaced bronze bushings of large area which hold the squeeze head in alignment during the squeeze operation. An additional ball-type bearing carries the weight of the head when it is rotated into or out of the squeeze position. An adjustable stop permits the head swing to be limited to the shortest possible travel for any particular job.

Vertical adjustment of the squeeze



Cleaning of the metal parts is accomplished by the vapor rising from boiling Cecoline in the bottom of the tank.



plate is provided through large screw and nut, both of which are plated with a corrosion resistant metal. This adjustment is simplified by means of a positive quick-operating clamp.

The draw mechanism is adjustable from 3 to 6 in., in  $\frac{1}{2}$ -in. steps, thus permitting speeding up the draw operation on shallow work. Two rigid arms fastened securely to the machine frame fall into position automatically under lifting of the frame during the squeeze operation. The draw commences as soon as the lifting frame makes contact with these arms on the downstroke.

The vibrator is controlled automatically by the motion of the squeeze piston and the operating valve. As the valve is turned to the draw position, the vibrator starts to operate; as soon as the pattern is free of the sand, the downward movement of the table automatically causes the vibrator to cease operation.

The design and location of the guide pins permit smooth operation of jolt, squeeze and draw over long periods of service. Use of only two guide pins, accurately fitted to the lifting frame, is said to decrease the possibility of binding of the lifting frame, jolt table and main frame, all of which are held in alinement by the same two guide pins, which are carefully lubricated and shielded from the sand.

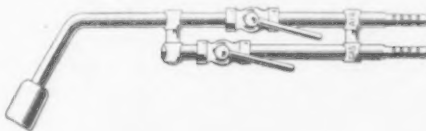
Other features include an automatic quick release valve which causes the draw to start without delay after the squeeze operation and a relief valve that permits exerting any predetermined amount of squeeze pressure on the mold regardless of variations in line pressure, provided that the line pressure at no time falls below the

pressure to which the valve is set. Upon completion of the draw, the lifting frame is lowered by tripping with a foot lever the two vertical arms which support it during the draw. The drop of the frame is not severe, air cushions being provided at the bottom of each guide bushing.

Push-type lubrication fittings are used throughout the machine which is designated as the No. 814. The maximum flask length (inside the sand strip) is 30 in. and the maximum flask width is 24 in. The jolt capacity is 700 lb.

## Blowpipe Uses Natural Gas

**A**IR-GAS blowpipes designed especially for burning natural gas, but suitable also for use with coal gas, have been placed on the market by the Torit Mfg. Co., 171 West Third Street, St. Paul, Minn. Operating on



gas and compressed air, they are intended for soldering, light brazing, tempering, melting, core drying and similar operations, not for welding. They are light and well balanced and are said to be leakproof and economical of gas and air. Adjusting valves give either a small hot flame or a large soft one. Five sizes are made.

**T**HE portable disk sander-grinder shown at right is equipped with a vacuum system for dust disposal.

## Dustless Disk Sander Grinder

**A** PORTABLE disk sander-grinder equipped with a vacuum system for picking up the dust has been brought out by the Porter-Cable-Hutchinson Corp., Syracuse, N. Y. In addition to eliminating a health hazard, the dustless feature facilitates use of the machine in edging floors and in sanding other wooden surfaces. Power and speed are also emphasized on production work, such as preparing automobile bodies for painting, grinding down welds and smoothing or finishing metal surfaces.

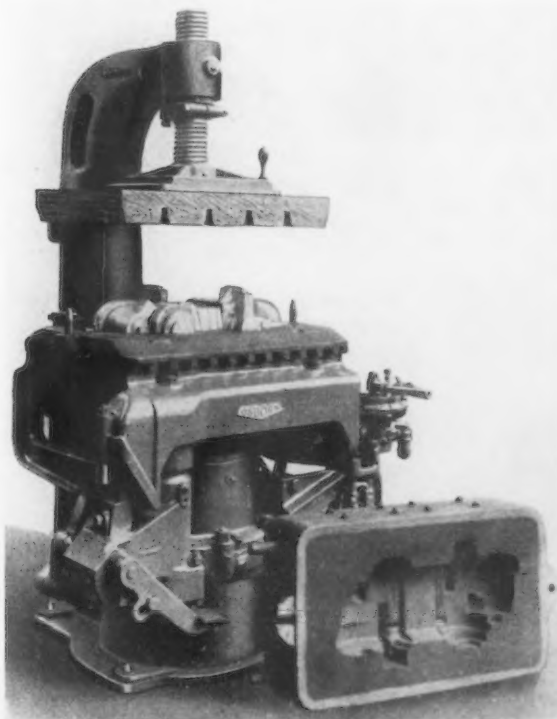
The machine is driven by a 1-hp. General Electric motor that is completely sealed from dust, and is equipped with a 7-in. abrasive disk. The cutting speed is 3200 r.p.m. and the no-load speed is 3700 r.p.m. Disks are retained by a thin head-screw which is tightened in a recess below the surface of the abrasive by means of a socket wrench, and may be changed quickly. A rubber pad gives flexible backing to the disk. Any degree of finish can be secured by using abrasive disks of suitable fineness.

The sander is operated simply by grasping the two handles and tilting it forward about 5 deg. on to the disk. A double-pole toggle switch is mounted on one handle to facilitate



turning the motor on or off. When the nature of the work is such that it is impossible to allow the weight of the machine to rest on the work, an Emmons balancer may be used with the machine. Precision ball bearings are used throughout. The height of the machine is 12 in. and the weight, 21 lb., net.

Large potential demand for automotive equipment abroad as the result of the rapid growth of motor transportation in foreign countries is indicated in a survey of foreign markets for automotive equipment, the first of its kind, which is being published by the Automotive Division of the United States Bureau of Foreign and Domestic Commerce.



**T**HE jolt squeeze strip-per molding machine at left is designed for rapid operation and minimum of non-productive time.

## Sheet Steel Cabinet for Machine Accessories

WITH the inclosed sheet steel Machine Tender brought out by the Stackbin Corp., Providence, R. I., tools, dogs, chucks and other machine tool accessories and supplies can be stored at arm's length from the machine, saving time and making work



easier for the operator, it is stated. It also provides him with a personal cabinet for which he can be held responsible. The cabinet is equipped with a shelf, bench top and two doors provided with a padlock hasp. It can be supplied with or without casters, and in a soft green velvet finish. The cabinet measures 18 in. in depth, 30 in. in width and 32 in. in height.

## Industrial Locomotives With Double Power Units

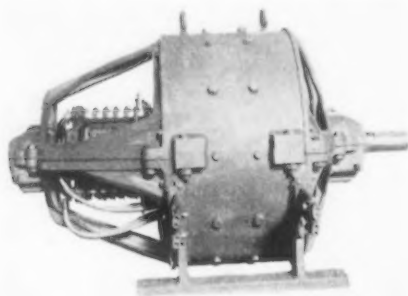
A CENTER type high cab is provided in a newly designed gas-electric and oil-electric locomotive brought out for industrial use by the Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, Ohio. This cab gives good vision in both directions, which, it is pointed out, is of great advantage in switching service.

The line includes high or low center

cabs or end cabs with either double or single control stations and single or double power units. The double power units on the larger sizes provide for economical operation where peak loads are not constant, as only one unit need be used until increased load makes it necessary to put the second unit in operation. This is done by the operator without having to leave his seat.

## Larger Motors in Direct-Current Series

LARGER d.c. motors of Type T are being made by Reliance Electric & Engineering Co., Cleveland. The new motors range in size from 100 hp. at 800 r.p.m. to 350 hp. at 1200 r.p.m.



An unusual procedure was followed in their design: Thirty-four engineers responsible for the care and operation of motors in large plants were shown the tentative plans. Their recommendations for improvement, based upon their years of practical experience with all types and makes of motors, were incorporated in these new motors.

A rolled-steel split-frame construction is used. The feet and supporting members are of heavy bar steel securely welded to the frame. There are six main poles and six commutating poles. For the field coils metal bobbins are used.

Brackets and sleeve bearings are of split design. Two oil rings at the

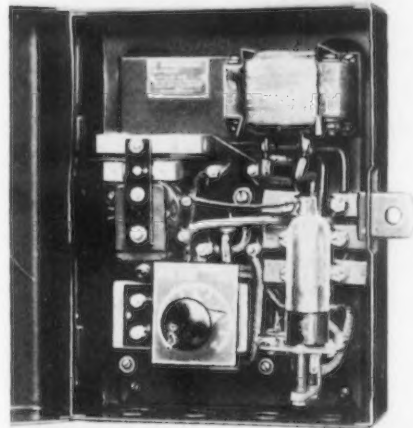
front end of motor and three at the back keep the bearings well lubricated. The brushholders combine the advantages of the reaction-type with those of the box-type. Brush studs are made of steel, cadmium plated. Heavy fiber insulation is used for the studs.

Hard-drawn copper bars are used for the commutator. The commutator construction is such that the bars will not loosen upon expansion or contraction. The leads are brought through both ends of the frame and held in place by wooden cleats. No terminal board is used, so that the connections can be completely taped and need not be exposed.

## Welding Timer Employs Electronic Tube

FOR accurate timing control of spot, projection and other resistance welding operations, Cutler-Hammer, Inc., Milwaukee, has brought out the timing device illustrated. Accuracy of better than a fraction of a second is attributed to use of an electronic tube. The device has an adjustable range up to 16 sec., the timing being adjusted by a knob inside the inclosing case.

Use of this welder control is said to enable unskilled operators to produce



successful welds and to virtually eliminate rejects and throw-outs. Small mounting space is required. The device operates on 110 to 550 volts alternating current, 25 to 60 cycles, and it is claimed that vibration, severe or intermittent service will not affect the accuracy of control.

Hoover Steel Ball Co., Ann Arbor, Mich., published in January the first issue of a monthly house magazine, which is available to executives and engineers. In addition to covering general topics, the publication presents informative articles regarding manufacture of balls and bearings.



## Will We Walk or Ride Out of the Depression ?

FORD'S plans for increased output have raised the question whether automobiles will lead us out of the depression. Undoubtedly the motor car industry will contribute conspicuously to recovery, but it is improbable that it will be able to claim leadership. Textiles and shoes have already shown some measure of recovery, being practically the only manufactured products whose output was greater in 1931 than in 1930.

The pick-up in boot and shoe production is shown in the chart, which gives a picture of the annual totals for the past three years. That the upward trend has continued into this year is indicated by a press dispatch from Boston stating that the Endicott-

Johnson Corp., a leading manufacturer, has shipped 20 per cent more shoes since the beginning of

the present selling season (Dec. 1, 1931) than in the same period one year ago.



	1929	1930	1931
Production of motor vehicles, United States and Canada .....	5,622,000	3,510,000	2,472,000
Production of shoes in the United States, number of pairs .....	361,402,000	304,170,000	316,240,000

## Are Prices Stabilizing ?

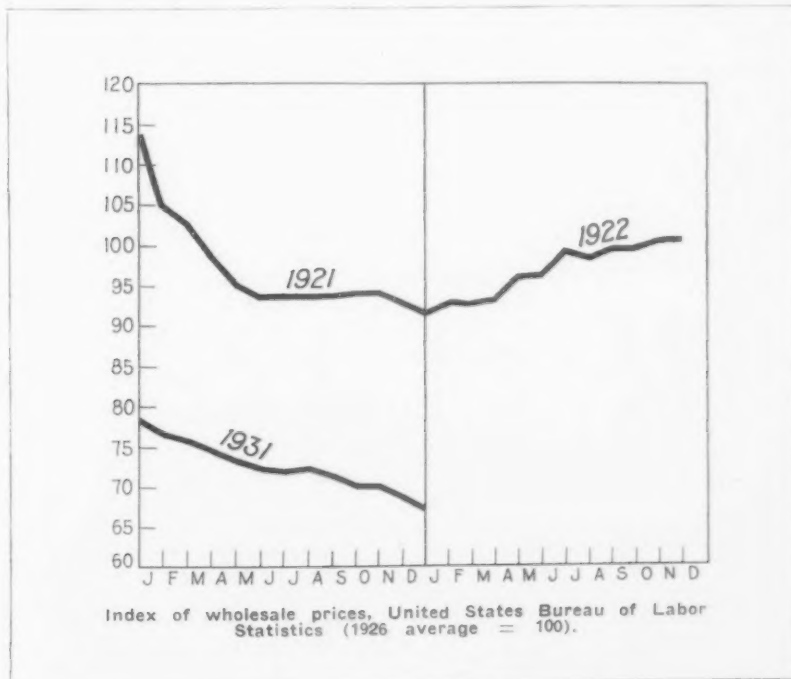
I N the steel industry and in other lines efforts to stabilize prices are more determined than at any time since the inception of the depression. One reason for this is the fact that prices have fallen so far below profitable levels. Another is that the decline in

prices has been so protracted that it seems reasonable to look for bottom in the next few months.

The graph shows the course of wholesale prices in 1921-1922 and from the beginning of 1931 to date. In the earlier depression the decline in prices set in in June, 1920,

and lasted for 20 months, reaching its nadir in January, 1922. The current decline in wholesale prices began in August, 1929, and has lasted for 31 months (February weekly figures forecasting a decline in the monthly index of the Bureau of Labor Statistics).

It will be noted in the chart that in both 1921 and 1931 there were periods in which prices showed signs of stabilizing. There is, of course, no assurance that the turning point of January, 1922, will presently be duplicated. However, the January, 1932, index number, at 67.3, is below the 1914 average of 68.1 and a number of recent business developments, both domestic and foreign, are encouraging, although still inconclusive. Both steel ingots and pig iron showed gains in production in February. Bank failures declined sharply in February and the amount of currency outstanding has undergone moderate reductions in recent weeks. Great Britain has repaid, six months in advance of maturity, three-quarters of the \$200,000,000 loan by American banks last August. Germany has repaid one-tenth of the credit extended by world banks last summer.





# British Pig Iron Demand Better; German Steel Output Still Low

## Russian Program Provides for Operation of 24 New Blast Furnaces —Belgian Home Buying Restricted

LONDON, ENGLAND, March 7 (By Cable).—Pig iron demand is reviving on generally improved sentiment, but actual business is meager.

Belgian home buying is restricted by failure of Belgian negotiations in the reorganization of the Continental Raw Steel Cartel, and prices have weakened.

German works are offering quick delivery. Production is still low.

There is little business in Welsh tin plate at the official price, but some reselling is being done by second hands. Makers will meet this week and discuss requests of some companies that the operation restriction plan be postponed for several weeks. It is pro-

posed also that the payments for production in excess of quotas and the bonuses for production below quotas be fixed at 2s. instead of 1s. as originally agreed. Some tin plate mills are sold up until the end of the summer on the basis of the proposed restricted output.

South African freights will be advanced 20 per cent on April 4.

The Russian program for 1932 provides for an output of 9,000,000 tons of pig iron, 9,500,000 tons of raw steel and 6,750,000 tons of rolled steel. The program involves the starting up of 24 new blast furnaces.

A sheet works being built at Semendria in Yugoslavia is expected to be in operation by autumn.

## British Prices, f.o.b. United Kingdom Ports

	Per Gross Ton	
Ferromanganese, export	£9 0s.	
Billets, open-hearth....	5 7½	to £5 12½
Black sheets, Japanese specifications .....	9 12	6d to 9 15
Tin plate, per base box	0 16	
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth....	7 7½	to 7 17½
Channels, open-hearth.	7 12½	to 8 2½
Angles, open-hearth....	7 7½	to 7 17½
Black sheets, No. 24 gage .....	8 0	to 8 10
Galvanized sheets, No. 24 gage.....	9 10	to 10

## Continental Prices, f.o.b. Continental Ports

	Per Metric Ton, Gold £ at \$4.86	
Billets, Thomas.....	£2 6s.	
Wire rods, No. 5 B.W.G.	5 5	
Black sheets, No. 31 gage, Japanese.....	11 5	
Steel bars, merchant...	2 10	
Beams, Thomas.....	2 9	
Angles, Thomas, 4-in. and larger.....	2 9	
Angles, small.....	2 11	
Hoops and strip steel over 6-in. base....	3 7 6d	
Wire, plain, No. 8....	5 7½	
Wire, barbed, 4-pt., No. 10, B.W.G.....	8 15	

# Scrap Holds Its Place as Leading Item Among Raw Material Exports

"IN 1931 a total of 136,125 gross tons of scrap iron and steel was exported from the United States," said Luther Becker, chief, iron and steel division, Department of Commerce, in addressing the Institute of Scrap Iron and Steel at Washington, March 9. "That so large a tonnage could be exported in a year of generally unfavorable conditions for foreign sales is a direct and distinct tribute to the position scrap iron and steel has attained as a basic material for the world's steel industry.

"In 1929 the United States led all other countries in the volume of its export trade in scrap. Shipments in that year reached the stupendous total of 557,044 gross tons, topping by

wide margins the exports of this material from France (324,338 gross tons), Germany (234,838 gross tons), Belgium-Luxemburg (230,888 gross tons), and the United Kingdom (179,036 gross tons). A comparison of exports from these five countries for a year later is, unfortunately, impossible at this time due to the non-receipt of trade returns.

"Returning to the United States export trade, it is interesting to note the marked change in the relative rank of the principal scrap markets. For example, Japan, the leading market in that year of largest trade—1929—gave way in 1931 to Canada, which had been the second market in the earlier year. Italy, the third mar-

ket in 1929, dropped to sixth rank in 1931, while Poland's 1929 rank of fourth declined to fifth in 1931. China and Mexico came forward to take the places vacated by these two and in 1931 ranked third and fourth, respectively, instead of eighth and ninth as two years before."

Canada, Mr. Becker pointed out, accounted for slightly more than one-half of all shipments in 1931. "Much of this tonnage doubtless moved to this destination because of the proximity of this market, but some account must be taken of the physical location of several Canadian plants which makes a supply of scrap distinctly welcome. These plants are some distance removed from sources of iron ore supply and therefore can find a more economical raw material in scrap, both from this standpoint and because the elimination (by the use of scrap) of the intermediate—pig iron—stage between the ore and even crude steel results in a marked saving in fuel consumed. Therefore the 35 per cent decline in the tonnage of scrap shipped to Canada in 1931 against 1930 cannot be considered to indicate any permanent derangement of this trade, especially when it is noted that the Canadian production of steel ingots and castings in 1931 was itself 33.4 per cent under that of the preceding year."

Whereas both Canada and Japan buy scrap for melting as part of their furnace charges, China imports old material for the use of her blacksmiths, metal workers, small foundries and forge shops, Mr. Becker said. Poland, Italy and Great Britain purchase large quantities of scrap to supplement inadequate ore supplies.

PRINCIPAL EXPORT MARKETS FOR UNITED STATES SCRAP IRON AND STEEL  
(In Gross Tons)

	1913 <sup>1</sup>	1927	1928	1929	1930	1931
Belgium .....	12	243	695	787	1,005	
Germany .....	9,367	18,984	20,304	6,783	2	
Italy .....	25,255	30,185	73,348	92,377	32,434	2,176
Poland and Danzig....	14,858	63,274	75,031	5,056	2,550	
Spain .....	1,169	3,163	1,740	14,922	10,216	
United Kingdom.....	75,467	22,514	178,536	2,807	4,177	1,947
Canada .....	1	2,983	4,711	111,849	103,643	68,210
Mexico .....				7,547	10,280	3,477
Chile .....					2,519	
China .....		4,067	9,223	8,184	9,339	7,026
Hong Kong.....		724	1,022	630	810	380
Japan .....		71,087	160,427	208,260	168,186	48,036
Kwantung .....		6	1,110	2,543	2,004	22
Egypt .....				8,675		
Other countries.....	369	10,234	3,530	3,220	2,415	694
Total .....	102,201	239,209	516,148	557,044	358,649	136,125

<sup>1</sup> Fiscal year beginning July 1, 1912, and ending June 30, 1913.

# January Exports of Iron and Steel Again Decline; Imports Also Small

WASHINGTON, March 1.—Declining to 40,650 gross tons, exports of iron and steel from the United States in January were only 9597 tons in excess of imports, which amounted to 31,053 tons. The outgoing movement was the lowest in more than a quarter century.

Of the January exports, 10,129 tons went to Canada and 9176 tons to Japan, these shipments constituting

almost 50 per cent of the entire movement. The largest item of exportation was scrap, 7572 tons, of which 5324 tons went to Japan. The largest movement in the finished line was in tin plate, 5311 tons, of which 1201 tons went to Japan, 990 tons to Argentina and 720 tons to China.

The heaviest item of importation was pig iron, 9369 tons, of which 5239 tons came from the Netherlands

and 3551 tons from India. Of the 3428 tons of concrete reinforcement bars imported, 3085 tons came from Belgium, which supplied 10,697 tons of the total January imports. That country furnished 910 tons of the 2034 tons of hoops and bands imported, while 416 tons came from Germany, 375 tons from France and 327 tons from the United Kingdom. Expected shipments of tin plate did not arrive in January, since imports of that product were only 50 tons, all from Wales. Belgium supplied 2300 tons of the structural shape imports.

Imports of manganese ore from Cuba were 71,809 tons, while manganese concentrates reported were 16,894 tons, of which 7292 tons came from Russia, 5564 tons from Brazil, 3124 tons from the United Kingdom and 910 tons from India. Canada supplied 910 tons of the 1559 tons of ferromanganese imported. Other tonnages were from Norway, 479; Italy, 91, and United Kingdom, 79.



United States Imports of Pig Iron  
(In Gross Tons)

	January, 1932	December, 1931	January, 1931
India .....	3,551	491	8,336
United Kingdom.....	100	121	50
France .....	.....	.....	25
Netherlands .....	5,239	307	685
Sweden .....	98	.....	1,876
Norway .....	.....	2	51
Belgium .....	200	.....	.....
All others.....	131	118	118
Total .....	9,369	1,039	11,141

Sources of American Imports of Iron Ore  
(In Gross Tons)

	January, 1932	December, 1931	January, 1931
Chile .....	45,276	22,639	111,714
Cuba .....	22,000	11,000	.....
Spain .....	.....	.....	11,727
Canada .....	38	1,040	.....
Russia .....	7,300	23,550	20,713
Other countries.....	*14,517	31,658	5,091
Total .....	89,131	89,887	149,686

\*Includes 14,372 tons from Norway.

Imports of Iron and Steel Products into the United States  
(In Gross Tons)

	January, 1932	December, 1931	January, 1931
Pig iron .....	9,369	1,039	11,141
Sponge iron.....	.....	.....	101
Ferromanganese and spie- geleisen* .....	1,559	917	3,676
Ferrochrome† .....	30	.....	.....
Ferrosilicon‡ .....	8	8	270
Other ferroalloys.....	150	245	135
Scrap .....	411	341	1,714
Pig iron, ferroalloys and scrap .....	11,599	2,550	17,037
Steel ingots, blooms, bil- lets, etc.....	1,511	2,301	2,253
Wire rods.....	986	662	584
Semi-finished steel.....	2,497	2,963	2,837
Concrete reinforcement bars .....	3,428	2,030	2,937
Hollow bar and drill steel Merchant steel bars.....	53	51	78
Iron bars .....	3,817	4,564	4,287
Iron slabs .....	18	33	109
Boiler and other plate....	.....	1	.....
Sheets, skelp and saw plate	30	22	56
Tin plate.....	260	235	1,167
Structural shapes.....	50	16	21
Sheet piling.....	3,779	5,646	6,779
Rails and rail fastenings.	182	285	299
Welded pipe .....	404	407	279
Other pipe .....	202	159	1,584
Barbed wire .....	1,325	1,675	629
Round iron and steel wire	147	118	174
Flat wire and strip steel.	71	96	44
Wire rope and strand....	139	165	156
Other wire.....	84	24	60
Hoops and bands.....	2,034	4,348	1,559
Nails, tacks and staples..	800	335	538
Bolts, nuts and rivets....	18	5	141
Other finished steel.....	6	3	6
Rollled and finished steel.	16,847	20,218	20,903
Cast iron pipe and fittings	11	21	726
Castings and forgings....	171	60	125
Total .....	31,053	25,812	41,628

\*Manganese content only.

†Chromium content only.

‡Silicon content only.

Exports of Iron and Steel from the United States  
(In Gross Tons)

	January, 1932	December, 1931	January, 1931
Pig iron .....	325	406	419
Ferromanganese .....	5	53	.....
Scrap .....	7,572	5,973	9,472
Pig iron, ferroalloys and scrap .....	7,902	6,432	9,891
Ingots, blooms, billets, sheet bar.....	160	92	600
Skelp .....	1,056	2,265	7,957
Wire rods .....	1,108	2,162	3,249
Semi-finished steel.....	2,324	4,519	11,806
Steel bars .....	1,769	2,605	3,922
Alloy steel bars.....	45	88	433
Iron bars .....	30	30	44
Plates, iron and steel....	1,045	1,216	2,106
Sheets, galvanized steel..	2,605	3,471	3,086
Sheets, galvanized iron..	139	235	717
Sheets, black steel.....	3,390	6,324	8,641
Sheets, black iron.....	175	378	713
Hoops, bands, strip steel.	1,863	1,616	3,448
Tin plate;terne plate....	5,311	5,820	6,780
Structural shapes, plain material .....	792	4,368	9,334
Structural material, fabri- cated .....	1,661	1,692	5,160
Tanks, steel .....	158	488	1,702
Steel rails .....	1,165	4,137	1,264
Rail fastenings, switches, frogs, etc.....	348	366	503
Boiler tubes .....	222	346	769
Casing and oil-line pipe..	1,115	1,008	4,177
Pipe, black and galva- nized, welded steel....	2,579	3,919	4,654
Pipe, black and galvanized, welded iron.....	75	366	721
Plain wire.....	698	978	1,508
Barbed wire and woven wire fencing.....	1,478	1,630	2,767
Wire cloth and screening	42	47	65
Wire rope .....	155	180	248
Wire nails.....	1,202	1,161	978
Other nails and tacks....	298	356	412
Horseshoes .....	23	4	2
Bolts, nuts, rivets and washers, except track..	225	284	505
Rollled and finished steel.	28,608	33,113	64,659
Cast iron pipe and fittings.	499	1,251	2,518
Malleable iron screwed fittings .....	117	251	682
Car wheels and axles....	144	583	897
Iron castings .....	140	230	397
Steel castings .....	98	64	433
Forgings .....	478	306	790
Castings and forgings....	1,476	2,685	5,717
All other.....	340	514	646
Total .....	40,650	57,263	92,719

# Price Stabilization Is Need of the Drop Forging Industry

C. H. Smith, President, American Drop Forging Institute, Says Trade Is Suffering from Its Own Stupidity

**D**ECLARING that the primary need of the drop forging industry is price stabilization, C. H. Smith, president, American Drop Forging Institute, who is also president of the Steel Improvement & Forge Co., Cleveland, addressed the Cleveland chapter, American Society for Steel Treating, on March 7 on the reconstruction program necessary for this branch of metal-working.

"Industry everywhere is talking about its reconstruction program," said Mr. Smith. "In the drop forging industry we are probably suffering from the natural consequences of our own stupidity." He added that one of the most difficult problems for the industry in the era of reconstruction will be price stabilization.

"Price stabilization," he said, "means, first of all, that business men engaged in the same industry must substitute cooperation for cutthroat competition. I believe that the price situation today is the most difficult problem which all industry has to face.

## Better Knowledge of Costs Required

"A correction of this evil can be brought about by a better knowledge of the cost of production. This can be accomplished by establishing in each factory in the industry a reliable uniform cost-finding method. Unfortunately, there will be some in every industry that will learn this lesson when it is too late through plant failure, and quite frequently the cause of the

failure will be inadequate price structure, although loose credits are causing quite a few failures. Then we will always have with us the so-called miracle-worker who can always take a job a little cheaper than anyone else. He, too, will learn his lesson.

"A careful study of modifications of our anti-trust laws will help industry to develop some definite relations between capacity and sales. A greater interest in the activities and operation of your trade association will help you to know more about your industrial problems, for never before in the history of this country has the need been greater than it is today for us to strike a balance between cooperation and competition, and the sooner industry learns this lesson, the more quickly will any particular group surmount these ever-increasing difficulties.

"Each drop forging company should have a more thorough knowledge of the economic fundamentals surrounding its business and have a greater realization that national prosperity is founded on individual prosperity, and that profit is the basis for this prosperity, and also profit is to be understood to mean something above a mere existence.

"I believe that every industry is awakening to the realization that senseless selling at prices below actual manufacturing costs is the one big factor that has caused the cutting of salaries, the reduction of employment and even the liquidation of some

of our companies, and the unfortunate part of it is that probably more liquidation will follow.

"The buyers, too, have also played an active part in the present situation, especially those that have played their sources of supply against each other, sapping the life blood of business prosperity, failing to realize that somewhere in the course of his day's activities he or his associates becomes a seller.

"Of course, it is not always the buyer, himself, that is responsible, but it is the management of his company that approves of such a purchasing policy. Management should stop to consider the dangers of destructive buying and realize that it is destroying the buying power of the masses and possibly for his own products.

"It is reasonable to assume that out of the experience of the last two years we will have learned something that will help us to profit by the errors of the past and meet the new issues of the day with sounder policy and more efficient practice.

## Survey Being Completed

"The Department of Commerce is now working on a survey of the drop forging industry, sponsored by the American Drop Forging Institute, which, when completed, will give this industry some illuminating statistics. It will give a cross section of our industry geographically. It will also group concerns with production of various amounts. The so-called commercial shop, whose production is sold as rough forgings, will be given another classification, but in no instance will data pertaining to an individual concern be furnished.

"With the different classifications further information will be presented, covering distribution of production by types of forgings; by investment in fixed assets, machinery, supplies and inventory; production of rough forgings, sales and capacity."

## Aluminum Alloy Airplane Parts Heat Treated by Immersion Process

(Concluded from page 607)

Other parts, when treated, are kept in the hot solution for varying periods according to the thickness, 9 min. being required for a part 0.0179 in. thick and 28 min. for metal 0.2043 in. thick. A test piece from the same stock is always immersed with the parts and, after being treated, is sent to the laboratory for testing. Dural is expected to test 55,000 lb. per sq. in. minimum according to the Government specifications, and this is usually indicated by a Rockwell of 58 to 60 on the B scale. Wire baskets are used for handling different-shaped parts, the longest being about 8 ft.

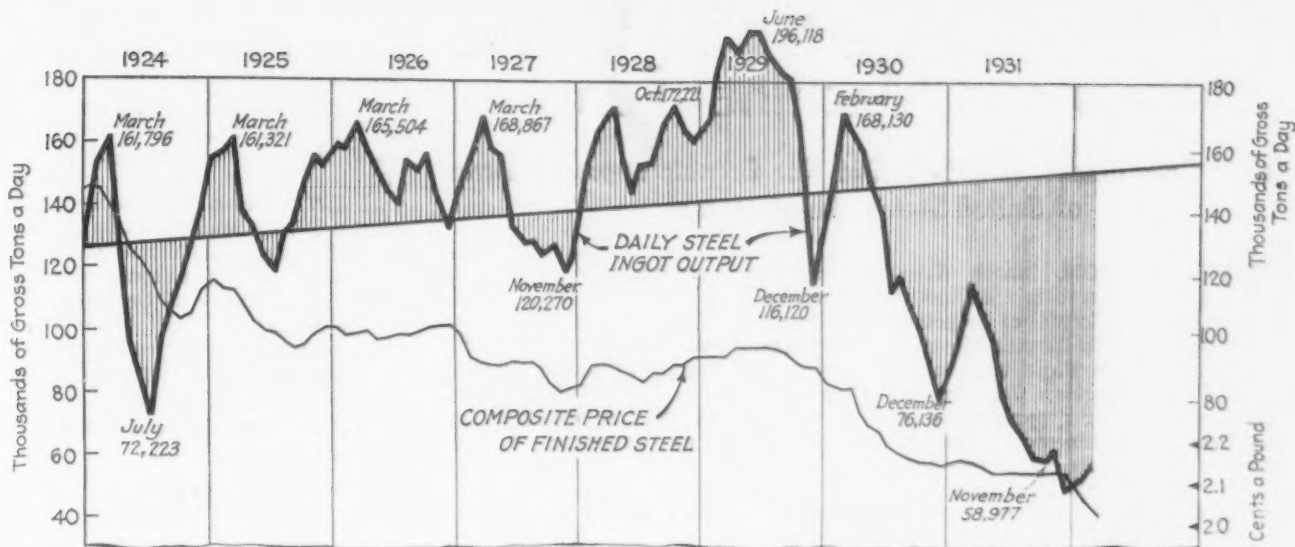
Some parts are formed here and these are frequently annealed to bring them to a satisfactory softness so that they will not crack during this operation. In this case they are immersed in the same hot solution but at a temperature of 600 to 650 deg. F. and for periods from 12 to 16 hr.

Most all parts not of aluminum are received at this plant already heat-treated, but there are some exceptions and for these there is another heat-treating room which is equipped with standard brick and steel furnaces. There are two of the box type, one being 3 ft. square and 4 ft. long and

heated with two gas burners. This is used mostly for heating rustless steel sheets for forming into exhausts. These must be formed hot. Another is 4 ft. square and 5 ft. long and is heated with four similar gas burners. This is used interchangeably for all kinds of heat treatment.

The gas tanks for the Boeing planes are of aluminum and extensively baffled inside in order to support the sides and prevent the gas from slushing. All of the edges and seams are welded while the baffles are riveted. The rivets are put in place and the ends melted down with a torch instead of being hammered. The tanks are then annealed for a few minutes at 600 deg. F., which renders the whole structure ductile enough to be unaffected by vibration.





## Ingot Output Gained Slightly in February

**P**RODUCTION of open-hearth and Bessemer ingots in February gained almost 4 per cent over that of January, figured on the daily rate, which was 58,382 gross tons last month against 56,203 tons in the preceding month. The computed total output for February, however, was slightly under that of January because of one less working day. The February total was 1,459,547 tons, against 1,461,290 tons in January. Last year there was a 14 per cent gain in February over January in daily output.

The average rate of operation last month, based on the annual capacity of 66,069,570 tons, as of Dec. 31, 1930, was 27.57 per cent, or slightly above the 26.54 per cent rate of January.

In February, 1931, the total output was 2,502,366 tons, or 104,265 tons a day, and the average rate of operation was 49.08 per cent of the institute's capacity figure.

The total of open-hearth ingots gained in February despite the fact of one less working day, but Bessemer ingot production declined.

### Malleable Castings Orders Increased

WASHINGTON, March 8.—Orders for malleable castings rose to 21,932 net tons in January from 19,811 tons in December, according to reports received by the Bureau of the Census

from 118 establishments. Production increased to 22,030 tons from 21,503 tons.

### Plate Fabrication Orders Higher in January

WASHINGTON, March 8.—Orders for fabricated steel plate in January rose to 17,613 tons from 16,442 tons in December, according to reports received by the Bureau of the Census from 51 manufacturers. The January orders, stated in net tons, were distributed as follows: Oil storage tanks, 4783; refinery materials and equipment, 444; tank cars, 11; gas holders, 122; blast furnaces, 129; miscellaneous, 12,124.

### Fabricated Structural Steel Low in January

WASHINGTON, March 8.—Orders for fabricated structural steel reported to the Bureau of the Census for January declined to 44,789 tons from 89,674 in December. Estimated bookings were 49,200 tons, against 97,600 tons. Shipments reported were 49,161 tons, compared with 91,896 tons. Computed shipments were 66,000 tons as against 122,800 tons.

Orders for shelving furniture in January were valued at \$166,451, against \$182,768 in December, according to reports received by the Bureau of the Census from 36 establishments. Unfilled orders rose to a value of \$225,083 from \$188,906.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS  
(Gross Tons)

	Reported by Companies Which Made 95.21 Per Cent of the 1930 Ingots		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
Total, 1930 .....	32,405,466	5,020,588	39,286,287	126,322	311
1931					
January .....	2,044,298	296,620	2,458,689	91,063	27
February .....	2,085,529	296,972	2,502,366	104,265	24
March .....	2,504,060	346,139	2,993,590	115,139	26
April .....	2,275,404	316,668	2,722,479	104,711	26
May .....	2,033,833	301,639	2,505,485	96,365	26
June .....	1,730,109	246,365	2,075,910	79,843	26
Six months .....	12,723,233	1,804,403	15,258,519	98,442	155
July .....	1,570,776	225,030	1,886,153	72,544	26
August .....	1,462,720	174,380	1,719,462	66,133	26
September .....	1,274,321	199,151	1,547,602	59,523	26
October .....	1,320,158	195,943	1,592,376	58,977	27
November .....	1,276,906	240,441	1,593,684	63,747	25
December .....	1,069,468	170,546	1,302,399	50,092	26
Total, 1931 .....	20,697,582	3,009,894	24,900,195	80,065	311
1932					
January .....	1,230,661	160,633	1,461,290	56,203	26
February .....	1,232,568	157,067	1,459,547	58,382	25

# France to Curtail Imports of American Machine Tools

French Government, It Is Said, Did Not Consult Representatives of United States Manufacturers

WASHINGTON, March 8.—Much interest is manifested in the outcome of negotiations taken up with French Government authorities in Paris by a committee of the American Chamber of Commerce regarding proposed import restrictions on machine tools. Representations made to the French authorities by the committee, headed by Charles G. Loeb, president of the American chamber, indicated that American machine tool manufacturers desire to make protests direct before the proposed restricting import quotas are fixed.

Published reports from Paris quoted Mr. Loeb as saying French authorities in virtually every case held preliminary conversations with European manufacturers before fixing quotas, but in no case have consulted American manufacturers. He declared German makers have been consulted regarding the machine tool quotas.

During the past three years machine tool exports from the United States to France are estimated at an average of about \$5,000,000 so that restriction by even a small percentage would be a serious matter. Reports have it that the proposed restrictions will be based on 1931 imports and it

is said in some quarters the cut on American imports would range above 50 per cent of last year's shipments. However, Louis Rollin, French Minister of Commerce, is quoted as saying that American imports will be cut to 10 per cent of those received last year. Such an extremely drastic slash is held by the American trade to be improbable, though it is not definitely known whether this is actually the plan.

The plan of the French has become additionally disturbing because, according to a published report, German manufacturers have recommended that they be allowed to send into France in 1932 70 per cent of the value of machine tools they exported to that country last year. It has not been made clear whether reparations shipments would be included in this aggregate.

"Importers of American machine tools were not consulted and we hope you will hear them before final action is taken," Mr. Loeb is quoted as having said to M. Rollin.

Among the more important lines shipped from the United States to France are lathes, gear cutters, grinding machines, and sheet and plate-working machinery.

## Tool Engineers Form National Society

The American Society of Tool Engineering was formed at a meeting in Detroit on March 3 to advance the knowledge of tool engineering. Headquarters have been established at 8203 Woodward Avenue in that city. Officers consist of J. A. Siegel, Packard Motor Car Co., president; W. H. Smila, Chrysler Corp., first vice-president; E. J. Ruggles, Gemmer Mfg. Co., second vice-president; A. M. Sargent, Pioneer Engineering & Machine Co., secretary, and William J. Fors, Stenger Die & Tool Co., treasurer.

Senior membership in the new organization is open to tool engineers "of recognized ability to plan the order of operations and layout and supervise the design and manufacture of tools and equipment," to tool, die or machine designers with five years' experience and to executives possessing knowledge of tool engineering for mass production. Tool designers with

less than five years' experience and students in recognized schools or colleges studying tool designing or tool engineering are eligible to junior membership.

## Gray Iron Production Up Slightly in January

Gray iron production gained very slightly during January as compared with December, according to the monthly report of the Gray Iron Institute. Foundries reporting operated at 37.8 per cent of normal capacity during January, against 37.6 per cent in December. However, there is a much better showing in respect to new business and unfilled orders.

Increased production was confined to the district comprising Pennsylvania, Michigan, Ohio and Indiana, which showed a gain from 34.1 per cent of normal in December to 41.1 per cent in January. Production in other districts declined slightly. New business gained from 30.7 per cent in December to 35.4 per cent in Janu-

ary and unfilled orders gained from 22.6 per cent to 28.9 per cent. Increased production was mostly in the larger foundries having a capacity of 250 tons or more per month.

By districts the January production in the New England States, New York, New Jersey and Canada was 36.3 per cent in January, compared with 43.7 per cent in December. Wisconsin, Illinois and the area west of the Mississippi River showed a production of 34.5 per cent, compared with 36.1 per cent in December, and in the Chicago district there was a production of 36.6 per cent, compared with 43.3 per cent during the previous month.

Two foundry executives reported the business outlook good, 23 fair, 48 poor and 42 bad.

## Steel Barrel Output Off in January

WASHINGTON, March 8.—Production of steel barrels in January decreased to 359,685 units from 382,483 in December, according to reports from 27 establishments to the Bureau of the Census. Unfilled orders at the end of January for delivery within 30 days rose to 168,650 barrels from 150,650 at the end of December, while unfilled orders for delivery beyond 30 days increased to 756,786 from 469,548.

## Canadian Steel Output Higher in January

Canadian production of pig iron in January declined, but the output of steel ingots and direct steel castings was 20 per cent larger than in December. Output of ferroalloys also increased slightly. January production figures and comparisons follow:

	Jan., 1932	Dec., 1931	Jan., 1931
(Gross Tons)			
Pig iron .....	10,305	13,862	35,592
Steel ingots and direct steel castings .....	25,060	20,969	57,598
Ferroalloys ....	1,823	1,814	4,467

## New Standard for Steel Bars Is Approved

A new American standard for steel reinforcing bars (A47-1932), sponsored by Concrete Steel Institute and National Bureau of Standards, has been approved by American Standards Association. The new standard gives 11 standard cross-sectional areas, ranging from 0.05 to 1.56 sq. in. Such designation for reinforcing bars is commonly used and is considered preferable to designating a round bar by its diameter or a square bar by its sides.

# OFF THE ASSEMBLY LINE



## Sentiment at Detroit More Cheerful as Ford Begins Operations

▲ ▲ ▲

DETROIT, March 7.

**A**LTHOUGH steel mills and other suppliers still are waiting on Ford releases to revive production, sentiment here is distinctly more cheerful than at any time in months. It is hoped that the expansion of manufacture at Dearborn and the placing of large orders with parts makers will provide the impetus needed to lead the country out of the depression. Detroit feels that the unlocking of the Ford doors will be beneficial to all motor car companies, most of which, regardless of the price class of their product, are suffering from the buying lull precipitated by Mr. Ford's recent announcements.

The Ford company ordered small tonnages of steel the past week, but volume purchases have not yet materialized; however, they are expected any day. It is known that Ford has either made up into bodies and other parts or now has in process of manufacture steel for 50,000 cars. In view of the fact that over 100,000 orders for cars already have been booked and perhaps 75,000 cars are necessary to stock dealers, it is obvious that production cannot go far until substantial steel releases are given. It is reported that more motors were made at the Rouge plant the past week than at any time since the shutdown early last summer. More than half of the 70,000 men employed at Rouge are working five and six days a week, so that it is evident that preparations for volume production are being pushed as rapidly as possible.

It is understood that the Ford wheel plant at Hamilton, Ohio, has turned out less than 20,000 wheels thus far, most of its time in recent weeks having been occupied in experimentation. Most of the wheels now on hand at branch assembly plants have come from the Kelsey-Hayes Wheel Corp., which has been manufacturing new Ford wheels for several months. Electric Auto-Lite

February motor car output estimated at 130,000 cars. March assemblies will depend on Ford developments.

\* \* \*

Chrysler, Studebaker, Packard and Hupmobile showed a production gain in February over January.

\* \* \*

Half of the 70,000 men now employed at Ford's Rouge plant are working five or six days a week.

▼ ▼ ▼

at Toledo reports orders for March 40 per cent ahead of those of February, largely as a result of Ford releases. Ford is now constructing a plant at Ypsilanti, Mich., where it will make a large part of its electrical equipment, such as ignition systems, timers and distributors. This will not be ready until at least late summer; nevertheless, it looms as a threat to suppliers now engaged in this activity for the Ford company.

### Ford to Resemble Lincoln

The new Ford body is said to resemble closely, on a smaller scale, the Lincoln with its sloping windshield, gracefully curved top and rounded rear end. The radiator is designed so as to reflect the trend toward streamlining. Gas consumption of the eight will be little more than the four. It is generally agreed, as pointed out previously in this column, that the V-eight will sell at about the same price as model A; the improved four, hereafter to be known as the Ford four, at \$100 less. Orders on hand now are running in the ratio of three to one in favor of the V-eight. Nothing has occurred to change the opinion that Ford cannot get into volume production before some time in April; some skeptics doubt that an output

of 4000 or 5000 cars a day can be attained before at least May. They point to the slowness with which model A got started as justification for their views. Ford now has four open-hearth furnaces in operation, with the probability that at least that number will be active indefinitely.

### Chrysler Shipments Gain

February shipments of Chrysler-made cars (Chrysler, Dodge, DeSoto and Plymouth) were 36 per cent ahead of those of January, and for the first two months this year were slightly better than in the corresponding period last year. DeSoto schedules for March show a gain over March, 1931, and DeSoto deliveries are 80 per cent of those in the banner year of 1929. Plymouth is said to have a program of 18,000 cars to be assembled this month to stock its dealers with new models. Graham-Paige turned out 2095 cars last month; its retail sales from Jan. 1 to Feb. 20 increased 12 per cent over 1931. Auburn made 1406 units in February, as against 2508 in January and 4054 in February last year. Studebaker Corp. sold over 5000 cars and trucks last month, a gain of 68 per cent over January and of 13 per cent over February, 1931. These figures do not include Rockne or Pierce-Arrow sales. Rockne is stepping up production at its local plant, expecting to reach a daily assembly of 250 cars by the middle of this month. Manufacture of the "65" at Detroit did not begin until Feb. 16 and about 1000 cars were made in the first two weeks of operations. Rockne's tentative March schedule for both South Bend and Detroit is for 6000 cars. Packard's shipments during February were 2150 cars, an increase of 270 per cent over the previous February. Production of the light eight was responsible for the improvement. Hupp made 1527 cars last month, as against 1409 in January and 1908 in February,



1931. Buick's output was 5000 cars, compared with over 6000 in January. The Continental-DeVaux Co. has been formed to continue the manufacture of the DeVaux six at Grand Rapids, although the main offices of the company will be at Continental's Detroit plant. Reo will bring out shortly a car in the \$1,000 class resembling its Royale line.

#### Steel Inquiries Out

Chrysler Corp. and Chevrolet, for its Flint and Detroit plants, put out second quarter steel inquiries the past week. Special attention is being concentrated on this prospective business, since it will serve as a test of the avowed intention of steel mills to get higher prices and thereby reduce or eliminate losses they have suffered in recent months.

### Concrete Steel Institute To Hold Meetings

The Concrete Reinforcing Steel Institute has arranged for three one-day sectional meetings and has cancelled its annual meeting, which was scheduled for Atlanta, Ga., March 7-9. These sectional meetings will be as follows: South, Atlanta Biltmore Hotel, Atlanta, Ga., March 7; East, Philadelphia, at a date to be set early in April; Central, Chicago, possibly latter part of April. M. A. Beeman is secretary, Tribune Tower, Chicago.

### Steel Castings Orders Declined in January

WASHINGTON, March 8.—Bookings of commercial steel castings in January declined to 17,393 tons from 20,799 tons in December, according to reports made to the Bureau of the Census by 130 plants. The output was 18,395 tons, against 22,064 tons.

Pennsylvania State College, State College, Pa., will hold its seventeenth annual summer management course from June 8 to June 16 under the auspices of the department of industrial engineering with the engineering extension department cooperating. This summer course, inaugurated in 1915 by Prof. Hugo Diemer, accommodates executives and foremen who, having had plant experience, wish to study and progress further in their knowledge of plant management.

A commercial standard for four-drainer wire cloth as used on paper-making machines has been published by the Bureau of Standards. Copies of the publication can be obtained from Superintendent of Documents, Government Printing Office, Washington, for 10c. each.

## PERSONALS

WILLIAM F. DRYSDALE, president of the Aerocrete Corp. of Canada, has been appointed vice-president in charge of sales of the Montreal Locomotive Works, Ltd., and all of its subsidiaries. The Montreal Locomotive Works is a subsidiary of the American Locomotive Co. H. C. BUTLER, manager of the Montreal works of the company, has been made vice-president in charge of manufacturing of the company and all its subsidiaries. Mr. Drysdale has had extensive experience in railroad work, having been identified with the industry since 1904.

DR. LIONEL D. EDIE, vice-president, American Capital Corp. and a regular contributor to THE IRON AGE on economic topics, is to take the negative side of "Should Inter-allied Debts to America Be Cancelled?" at a meeting of the New York Credit Men's Association, to be held at the Hotel Commodore, New York, on March 22. Dr. Marcus Nadler, professor of finance, New York University, will take the affirmative.

DR. ANSON MARSTON, for the past 28 years dean of engineering at Iowa State College, will retire from his administrative duties June 30. He will be succeeded by PROF. T. R. AGG, assistant dean of engineering.

VICTOR F. J. TLACH, president of Darwin & Milner, Inc., and of the Darwin Razor Corp., Cleveland, has been given the rank of honorary consul general for Austria in Ohio, Kentucky and Tennessee.

G. FRED SHERMAN, formerly assistant sales manager of Tube-Turns, Inc., Louisville, Ky., has been appointed manager of sales of the forged fittings division of the Bonney Forge & Tool Works, Allentown, Pa. BEN BUSH has joined the sales staff of that division, in charge of the New York and Pennsylvania district, and HOWARD F. GRIMES has been assigned to cover the Middle West.

C. H. CROCKER, comptroller, Worthington Pump & Machinery Corp., Harrison, N. J., has been elected vice-president of the newly organized comptrollers' division of the American Management Association.

R. F. MOSEDALE has been appointed representative in northwestern Pennsylvania and western New York, with office at 233 Jackson Building, Buffalo, for the Geometric Stamping Co., Cleveland.

DANIEL S. EDDINS has been elected president of the Olds Motor Works,

Lansing, Mich., division of General Motors Corp. He has been vice-president and general manager the past two years and will continue in the latter capacity. He has been associated with General Motors since 1918, at one time having been assistant general sales manager of the Chevrolet Motor Car Co. He joined the Oldsmobile staff in 1925 as vice-president and general sales manager, and in 1930 became general manager.

J. H. VAN DEVENTER, editor, THE IRON AGE, has been elected a director of the United Business Publishers, Inc., New York.

PAUL G. LEONI, managing director of William H. Muller & Co., Inc., and of Iron Ore Corp. of America, New York, has returned from a two months' business trip to Europe.

CHARLES PAGE PERIN, Perin Engineering Co., Inc., consulting engineer, New York, has been elected president of the American Institute of Consulting Engineers.

O. D. CONOVER has opened offices at 1740 East Twelfth Street, Cleveland, as a consulting engineer. He will handle various engineering problems in connection with the layout, design and construction of foundries and other industrial buildings. Mr. Conover was connected with the Austin Co., Cleveland, for 10 years, during which he devoted his attention largely to engineering service in connection with building new foundries. For the past three years he has been affiliated with the Foundry Equipment Co., Cleveland. Before his connection with the Austin Co. he was vice-president of the T. W. Price Engineering Co., New York and Chicago, during which time he gained considerable experience in both engineering and construction of steel plants.

W. L. BEHM, recently associated with the Jay Stephens Corp., Oliver Building, Pittsburgh, is now identified with the United Iron & Metal Co., Grant Building, Pittsburgh, dealer in old materials.

F. E. WILLIAMSON, president, New York Central Railroad, will be the guest of honor and principal speaker at the annual dinner of the Traffic Club of Pittsburgh, to be held in that city on March 10. Mr. Williamson was also the guest of honor along with Elisha Lee, vice-president of the Pennsylvania Railroad, at a dinner on March 9, at which George Gordon Crawford, president of the Jones & Laughlin Steel Corp., Pittsburgh, was host.

# OBITUARY

WILLIAM G. SHARP, vice-president, Hanna Furnace Co., Cleveland, died suddenly March 1, aged 40 years. After having been graduated from a Cleveland high school he became associated with M. A. Hanna & Co. and later was employed in the vessel department of the Cleveland-Cliffs Iron Co. and by the Kinney Steamship Co. Later he became president of the Wellston Iron Co., Jackson, Ohio, and in 1920 general manager of the Marting Iron & Steel Co., Ironton, Ohio, which position he held until he joined the Hanna Furnace Co.

GEORGE STROH, founder and president, Stroh Die Moulded Casting Co., Milwaukee, died March 1 after a long illness. He was born at Jordan, N. Y., in 1865, and in 1904 went to Milwaukee, where he established a non-ferrous foundry business that became one of the leading concerns in its line in the Middle West.

PETER H. BRODESSER, founder and president, Brodesser Elevator Mfg. Co., Milwaukee, died Feb. 26, aged 68. He was born in Germany and came to America in 1872. He received his degree in mechanical engineering at the University of Wisconsin and then joined the Bullock Machine Co., Chicago. On his return to Milwaukee, Mr. Brodesser formed the machine shop concern of Brodesser & Ternes, out of which was developed the Brodesser Elevator Mfg. Co., which discontinued business several years ago. He was widely known for his invention of an automatic elevator stop, a coal conveyor, a bark conveyor for tanneries and other mechanical devices.

KIRKS H. TAYLOR, formerly president of the National Association of Purchasing Agents, and from 1906 until his retirement three years ago purchasing agent for the Illinois Glass Co., Alton, Ill., died in a hospital there recently at the age of 64 years.

HENRY EHRET, president and founder of the Oakland Foundry Co., Belleville, Ill., died March 4 at a hospital there, after an operation. He was 76 years old. Associated with him in the business, which he founded 26 years ago, were his three sons, Hugo, Edward and Ferdinand.

R. H. CREVOISIE, chief engineer of the A. M. Byers Co., Pittsburgh, died on Feb. 27. Mr. Crevoisie had become associated with the Byers company in May, 1931, and previously served for a number of years as assistant chief engineer of the Republic Steel Corp., Youngstown.



**BURROWS SLOAN**, chairman of the board of the General Refractories Co., Philadelphia, whose death on Feb. 28 was noted in these columns last week.

THOMAS CHALMERS DARSIE, prominently identified with the coal and coke industry in western Pennsylvania, died at his home in Pittsburgh on March 2. He was born in Scotland, but had lived in Pittsburgh for almost 50 years, where he was well known as a trustee of the Thaw estate, controlling wide coal deposits in the vicinity.

DAVID MARK CUMMINGS, a director of the Morden Frog & Crossing Works, died March 1 at Phoenix, Ariz. He was born at Pekin, Ill., 66 years ago.

HENRY D. WARNER, of Hartford, Conn., for many years a machinery dealer and salesman, died suddenly on March 3.

CHARLES WIEGAND, former vice-president of the Standard Stamping Co., maker of tin ware, died at his home in St. Louis recently of heart disease. In 1874 he began his connection with the business founded by his father, and in 1908 was elected vice-president. He was 70 years old.

ROBERT HEATH, chairman, Robert Heath & Lowmoor, Ltd., Stoke-on-Trent, England, died at the age of 80 years.

HUGH R. CORSE, of the Lumen Bearing Co., Buffalo, died suddenly at his home in that city on Feb. 20, aged 52 years. After his graduation from

high school, he engaged in the manufacture of rubber goods and later in Detroit in the radiator business, automobile manufacturing and selling mill supplies. In 1910 he joined the sales department of the Lumen company and was connected with this company until his death, with the exception of the six years between 1914 and 1920, when he was identified with the Titanium Bronze Co. Mr. Corse was an active worker on the non-ferrous alloys committee of the Society of Automotive Engineers.

JOHN JAMES TOOLE, formerly superintendent of the Union Steel Castings Co., Pittsburgh, died at his home in that city on Feb. 26. He was born in England in 1853, and went to Pittsburgh in 1872, where he went to work for the Pittsburgh Steel Foundry Co. He was superintendent of the Union company for 28 years prior to his retirement 10 years ago.

WILLIAM H. MULLINS, one of the founders and long president of the Mullins Mfg. Corp., Salem, Ohio, died March 5, aged 76 years. The business was established in 1882 and Mr. Mullins bought out his partner's interests in 1890. The company first engaged in metal stamping and art metal work. Later it became engaged in the stamping of steel bodies for automobiles and other products. Mr. Mullins had been in poor health for four years and retired from active management of the company about eight years ago.

Corrosion of aluminum alloys is the subject of a bulletin, No. A6, issued for general distribution by the National Smelting Co., 6700 Grant Avenue, Cleveland. Electrolytic corrosion comes in for special attention. Aluminum silicon alloys are emphasized as offering good resistance to corrosion, besides presenting excellent casting properties. Electroplating on aluminum, it is agreed, offers good protection against corrosion, provided the aluminum or aluminum alloy is free from porosity. A properly applied coat of paint is a good protective agency, as electrolytic corrosion can hardly occur between paint and aluminum.

The technique and application of the Lindeweld process in the construction of a 20-in. natural gas pipe line are shown in detail in a new motion picture prepared by the Linde Air Products Co., 30 East Forty-second Street, New York. Close-up views show in detail the action of the flame on the metal and the flow of weld metal. The film, in two reels, is available in both 16 and 35 mm. sizes for showing before technical societies, engineering, trade and vocational schools, foremen's clubs and other technical and industrial groups.



# • • EDITORIAL

## Sales Tax on Metals and Products

THE application of the sales tax in the metal-working industries may present some confusing problems at first, but if the American law works as smoothly as the Canadian plan, after which it is patterned, manufacturers will soon become accustomed to the method of operation.

It is the purpose of the tax framers that there shall be no pyramiding of levies; the ultimate manufacturer will pay, or collect, the tax. For example, it is the understanding that a manufacturer of automobile parts would not pay a tax when such parts are to be assembled into a completed car, but would pay the tax if the parts were to be sold for repair work or replacements.

Steel, pig iron, scrap, copper and other materials which undergo further manufacture would not pay at the source. The tax will apply on the products in which these materials are used. However, there are some forms of steel, such as rails, wire fencing, barbed wire and wire nails, which undergo no further manufacture, and on these it is presumed that the steel companies would pay the tax. The operation of the law probably will require that steel companies pay the tax on sales to jobbers. Some steel companies, however, have anticipated the adoption of a sales tax by inserting a clause in their sales contracts whereby the sales tax, even if they collect it, will be passed on to the ultimate user.

But a good rule should work both ways. Where the raw material is already heavily taxed it would seem that there should be less tax on the finished product. In this connection it may be pointed out that the "tax" cost of steel, per ton, in the well-managed plant is now approximately \$4 as compared with a normal of approximately \$1. This, of course, is due to reduced volume.

If the adoption of the sales tax is a recognition of the principle that the unit of product should bear the tax burden, the steel industry can truthfully claim that it is already paying a 300 per cent increase.

## Reopening the Banks for Business

"recovery corner." Mere improvement in sentiment is now heavily discounted, for it has been learned that sentiment, unless backed up by actual betterment in business, pays no dividends.

In the face of this pronounced skepticism there has

been a gradual abatement of tension, with a concomitant gain in composure, if not confidence. Consciously or unconsciously, business is becoming more cheerful.

The most marked change in attitude is to be noted in the financial world. Only a few months ago the chief citadel of uncompromising deflation, our banking system recently found its own security threatened and was forced to seek the Government's aid, which was promptly supplied by the enactment of emergency legislation. No government can indefinitely guarantee the security of bank funds unless those funds are put to work, and there are already indications of a more liberal lending policy on the part of forward-looking financial leaders. If this change of front by lenders is presently matched by applications for loans by borrowers, the salutary effects on business should soon become apparent. It is time for borrower and lender to renew their acquaintance.

## Purchasing Power Widely Distributed

SUBSTANTIAL proof that the fruits of mechanization can be widely distributed, even in years of extreme depression, is offered by the recently issued annual report of one of the country's leading steel companies. In spite of the fact that the mills of this company are among the most modern in the world, their efficiency did not contribute to technological unemployment last year. The average number of employees on its payroll in 1931 was 23,441, an increase of 13.1 per cent over 1930, and of 2.2 per cent over the boom year 1929. While the total payroll naturally declined sharply last year, the average annual wage per employee still remained above \$100 a month, in spite of the comparatively large increase in men employed. With a payroll of \$29,619,397 in 1931, the average wage per employee was \$1,264. In the preceding year, with a much larger payroll and a smaller number of employees, the average wage was \$2,046. This reflected only a slight loss from the \$2,080 paid to each employee on an average in the peak year of 1929.

The change in the company's policy as the full effect of the severity of the business depression became apparent is self-evident. During 1930, before the extent of the depression could be known, efforts were made to maintain buying power even though the reduction in total payroll made a small decrease in the number of employees necessary. Last year, however, it was seen that maintenance of employee income would be impossible without drastic curtailment in the working force. At the same time commodity prices and the cost of living had declined to a point where actual wages might be sharply reduced without drastically affecting real wages. The course chosen is



# C O M M E N T . .

typical of the foresight being shown by many of our large industrial corporations in meeting the challenge of depression. As a result 13.1 per cent additional employees were paid a living wage, in spite of a 30.3 per cent decline in payroll, and the average income per employee was reduced 38.2 per cent. Although this latter decline is not entirely offset by the reduced cost of living, the sacrifice of the individual worker has been far from severe.

It might also be mentioned that dividends on common stock were discontinued during 1931, and that payments to common share holders amounted to only \$886,480 during the year, as compared with \$2,881,600 in 1930.

• • •

## Look for Increased Activity

A REVIVAL of industrial activity is perhaps much nearer than generally believed. It will be predicated on favorable mass psychology and not on indications of rising demands in any particular industry. Just as many decided almost simultaneously to sell in the securities market in late 1929, so increasing numbers are reaching the point of necessity but also of willingness to do some buying. And the attitude covers industries as well as individuals. No longer is it a distinction to have postponed purchases of personal needs. Instead there will shortly be the personal urge to right about face. Back of it all is the fact that now for some months consumption has been below 60 per cent of normal.

In steel what would be necessary to cover wear and tear needs and to provide for the small increment of increase that marks progress was about 152,000 tons a day in 1931. Yet the actual daily production was only 80,000 tons, or only about one-half of the long-time indicated requirement. So far this year against a normal of 153,000 tons a day, demand has called for only 57,000 tons. The question is how long can industry get along on a 37½ per cent of normal rate.

• • •

## Home Construction Imminent

ONE sad lesson is being learned by increasing numbers. It is that depreciation has definitely overtaken buildings only a few years old, especially dwellings. The deflation has become concrete in the call for reduction of mortgages.

In a period of relatively steady prices and no very rapid advances in home design, adornment or conveniences, little thought is given to loss on account of age.

Such a condition describes the interval since the last severe prolonged depression. Now the tenant is not satisfied only to have shelter when he sees all around him the newness in style, equipment and appurtenances that have been steadily outmoding the older structure. Home building has gone the way of the automobile, and depreciation will more commonly be mentioned in considering building finances.

The case is paralleled by the lofty steel-frame business building. New arrangements in respect to natural and artificial lighting and in improved elevator service, to mention two items only, bear down on the rental and resale values of existing structures. Obsolescence is at work though the skeleton has a life no one has yet been able to estimate. Recent history has shown that many buildings rounded out their economic life in 35 to 40 years because they could well give way to loftier buildings. In those cases the steel work proved as good as new.

The point of all this is that owners of homes will begin to learn that their possessions will sooner rather than later fail to support fixed charges. They must either give way to altogether new construction or be rebuilt in part to help make them economic units. It was with this probably in mind that Chairman Woolley of the American Radiator & Standard Sanitary Corp. claimed about two years ago that one million homes needed rehabilitation. Estimating that the average expenditure would be \$2000, he arrived at the imposing total of \$2,000,000,000 of work in prospect in this field. It is likely that some such sum still holds, and in the light of current self-interest rather than in that of the patriotic impulse earlier emphasized, we have a building industry outlook that is highly encouraging.

• • •

## Can the Big Hoarders Be Reached?

THE national drive against hoarding, inaugurated in a radio address by President Hoover, deserves the united support of all patriotic citizens. It has the merit of being more than a mere appeal to disgorge sequestered currency; it offers in the "baby bonds" a tangible inducement to return hoards to circulation.

The bond campaign, of course, is aimed principally at the small hoarders and there is no way of ascertaining the aggregate size of their holdings. Possibly, as some bankers believe, the lion's share of the country's immobilized money is made up of large hoards. The underworld's accumulations alone account for several hundreds of millions, it is said. Those bootleggers and racketeers who were not previously persuaded of the danger of having bank deposits were thoroughly convinced by the outcome of the Capone case.

## ... LETTERS TO THE EDITOR ...

### Refractories for Coreless Induction Furnaces

Editor, *The Iron Age*:

AT the end of the article in THE IRON AGE for Jan. 15, 1931, by the writer, entitled, "Tonnage Melting by Coreless Induction," a method for using refractories in furnaces of the coreless induction type of any size, is briefly described and illustrated in Figs. 6a and 6b. The caption under the illustrations is "Method of making the melting chamber."

This note is to call attention to the fact that the method of making the melting chamber and the particular kind of refractory used are quite independent of one another. At the time the article appeared, considerable use had been made of Tam zircon as a refractory. This is very good, especially for superheated cast iron, but later experiences with the recovery of rustless steel scrap have led us to adopt, for a basic refractory, a mixture of magnesia and alumina known as Almag. This particular combination of properly prepared magnesia and alumina neither expands nor contracts to any appreciable or objectionable degree from room temperature to the pouring temperature.

This refractory has also been found to be satisfactorily resistant to slags on the top of the metal. In a particular installation, 76 heats of rustless steel were melted of 8000 lb. each from one lining, which represents over \$90,000 worth of metal in ingot form poured from this lining. The user of this 4-ton furnace, energized with 1200 kw., reports that the refractory was removed while it still had considerable life in it, and 100 heats is the objective for future linings of this type used in a furnace of 4 tons capacity. The users of the furnace report that the composition of the rustless scrap was practically unaltered by the melting process.

### Industrial Finances

Colorado Fuel & Iron Co., Denver, reports a net loss for 1931 of \$3,363,206.69, including allowances for bond interest, depreciation and depletion and Federal income taxes. There was an operating loss of \$576,044.86. In 1930 the company had a net profit after all charges of \$298,648.59.

Foote Brothers Gear & Machine Co., Chicago, reports net loss in 1931 slightly less than in 1930, despite a reduction of approximately \$1,400,000 in sales. This is the result of operating economies aggregating more

If an acid lining is required, the above method can be used with ganister in place of Almag.

E. F. NORTHRUP,

Vice-President,  
Ajax Electrothermic Corp.,  
Trenton, N. J.

### Encouraging Employees to Read Industrial Papers

Editor, *The Iron Age*:

IDEAS are the bases of industries and yet many ideas remain unborn because business papers and technical journals are not properly circulated within industrial organizations. The setting aside of a small space, or a number of them, in strategic locations in both office and shop where such magazines, booklets and literature might be available to such employees as are eager to read and learn would undoubtedly be profitable in many ways.

The encouragement given employees to make use of their leisure time by reading such literature would result in many usable ideas, and if a suggestion box scheme were instituted at the same time these ideas could be collected and put into use.

C. E. SCHIRMER,

230 W. Liberty Street,  
Springfield, Ohio.

Editor's Note: THE IRON AGE heartily agrees with Mr. Schirmer that intraplant circulation of industrial and technical papers should be encouraged. At its own expense THE IRON AGE furnishes plant subscribers with routing forms, specially printed for each plant and listing the names of individual readers.

After THE IRON AGE has gone the executive rounds, many progressive plants place copies where they will be accessible to ambitious executives-to-be.

than \$700,000 annually. Operating loss last year, exclusive of operations of Western Gear Co., in liquidation, was \$718,481 in comparison with \$772,073 in 1930.

Link-Belt Co. reports consolidated net profits for 1931, at \$638,973, after preferred dividend, equal to 56c. a common share. In 1930 net profit was \$2,310,332, equal to \$2.89 a share. Current assets in 1931 stood at \$13,849,059 against \$15,870,939 a year ago.

Ex-Cell-O Aircraft & Tool Corp., Detroit, took full advantage of 1931

to perfect production and effect economies of management and operation, the results of which are already reflected in a profit during the month of January, the annual report shows. Ex-Cell-O showed a loss of \$259,108.60, after deducting all charges, including depreciation of \$191,506.58 and sundry reserves and inventory adjustments of \$44,374.02, for 1931. This compares with a loss in the previous year of \$154,364.89, after all charges, including depreciation of \$173,906.57. At the end of the year all questionable assets were charged off, the increased depreciation being significant of this policy, and additional reserves set up.

Sharon Steel Hoop Co., Sharon, Pa., reports a loss for 1931 of \$1,396,995.84, including charges for bond interest, depreciation, Federal taxes, etc.

Midvale Co., Philadelphia, reports a net profit for 1931 of \$750,115.73.

International Harvester Co., Chicago, had a net profit in 1931 of \$1,346,000. The company reports that its sales were 30 per cent less than in 1930 and that no profit was derived from the farm implement business in the United States and Canada last year.

Laclede Steel Co., St. Louis, for 1931 reports net earnings of \$148,416, after charges and income taxes, compared with \$451,577 in 1930.

Crucible Steel Co. of America and its subsidiary companies report net loss for 1931 of \$2,016,517, compared with net profit of \$4,045,122 in 1930. Operating profit in 1931, after deducting taxes, was \$1,450,477, while non-operating department loss was \$310,844. Repairs and maintenance expense, depreciation and renewal of plants and interest charges amounted to \$3,156,150.

Ludlum Steel Co. in 1931 had a net loss, after depreciation and taxes, of \$99,144, compared with net loss of approximately \$433,000 in 1930.

### Scale Models

In an article in THE IRON AGE of Feb. 25, page 497, entitled "Scale Models Serve Executive, Engineer and Salesman," there was an inadvertent omission of the name of the manufacturer of the models, the H. E. Boucher Mfg. Co., Lafayette Street, New York.

---

## SUMMARY OF THE WEEK'S BUSINESS

---

# Decline in Ingot Output Arrested; Miscellaneous Orders Increase

Important Buying by Automobile Industry, Railroads and for  
Construction Lacking—Price Stabilization Movement Gains

**D**ESPITE the continued absence of important tonnage from the three major steel-consuming groups—the automobile industry, the railroads and building construction—steel business is a shade better this week because of slightly expanding releases from miscellaneous consumers, and the average ingot operating rate for the country has risen one point to 27 per cent of capacity.

The Ford Motor Co., whose production plans have claimed the chief interest of steel companies in the past few weeks, has not yet placed any business of consequence, but substantial orders are expected any day. Meanwhile, other automobile companies have placed a check on their buying, though the Chevrolet and Chrysler companies have issued inquiries for some of their second quarter requirements.

**S**TRENGTHENING of the steel price structure has become a definitely constructive influence, which will be more strongly in evidence at the end of this month, when more liberal specifications against expiring first quarter contracts, taken at the former prices, are expected. The sales tax law, which will not take effect until 30 days after it is signed, may operate also to increase forward buying.

Steel companies, in announcing higher prices, in some cases for immediate orders and in others for second quarter, are not deterred by the fact that the business volume is not increasing sufficiently to give adequate support to such moves. Their determination to check their losses finds sanction in the wide admission that unless they do so a further wage cut may be inevitable.

Sheet manufacturers, who were the first to take a stand for higher prices, have apparently established them, at least on the common grades. Chicago mills have taken small orders for bars, plates and shapes at an advance of \$2 a ton, but a similar rise at Pittsburgh has not been tested. Makers of hot-rolled strip have announced second quarter prices, which for the smaller buyers will be \$2 a ton above the current level. A rise of like amount may become effective on cold-rolled strip. An outright reduction of \$10 a ton, however, has been made on electrical sheets.

With 2.20c. a lb., Pittsburgh, now effective on No. 24 hot-rolled annealed sheets, THE IRON AGE composite price for finished steel is advanced to 2.044c. from 2.037c., this being the first gain since June 30, 1931, and, with that exception, the first since Jan. 13, last year. The pig iron composite is unchanged at \$14.48 a gross ton, and steel scrap remains at \$8.25 a gross ton.

**S**UCH improvement as has occurred in steel business has come partly from manufacturers of electric refrigerators and steel barrels. Inquiries have been more numerous from makers of automobile parts and from users of structural steel and reinforcing bars. There are indications of more buying by the railroads, but delays are frequent, a case in point being the New York Central rail inquiry, which was expected last week, but which probably will not appear until next week. Even the few railroads that have recently bought rails are slow in giving releases. Tin plate rollings have improved slightly, though some is being produced in advance of specifications. A shipment of 3000 tons of Welsh tin plate has arrived on the Pacific Coast.

**G**AINS in steel ingot output have occurred at Pittsburgh, Cleveland, Wheeling and in the Valleys, being small in all instances and offset to some extent by losses elsewhere, particularly at Birmingham, where the stoppage of the Ensley rail mill has caused the shutting down of two blast furnaces and several open-hearth furnaces. The Ensley mill probably will resume on April 4.

The slight increase in the average operating rate for the country is the first check in the decline which started with the first week of February after a slowly rising trend in January. However, last month's ingot output, on a daily basis, gained almost 4 per cent over that of January, which, in turn, was 12.2 per cent better than December. February's daily rate was 58,382 gross tons, against 56,202 tons in January. Even with one less working day in the month, open-hearth output was larger than in January, though Bessemer ingot production declined.



# A Comparison of Prices

Market Prices at Date, and One Week, one Month and One Year Previous,  
Advances Over Past Week in Heavy Type, Declines in Italics

### Pig Iron

	Mar. 8, 1932	Mar. 1, 1932	Feb. 9, 1932	Mar. 10, 1931
Per Gross Ton:				
No. 2 fdy., Philadelphia.....	\$15.64	\$15.64	\$15.64	\$17.76
No. 2, Valley furnace.....	15.00	15.00	15.00	16.50
No. 2 Southern, Cin'ti.....	13.82	13.82	13.82	14.19
No. 2, Birmingham.....	11.00	11.00	11.00	12.50
No. 2 foundry, Chicago*.....	16.50	16.50	16.50	17.50
Basic, del'd eastern Pa.....	16.00	16.00	16.25	17.25
Basic, Valley furnace.....	14.50	14.50	14.50	16.50
Valley Bessemer, del'd P'gh.....	17.39	17.39	17.39	18.76
Malleable, Chicago*.....	16.50	16.50	16.50	17.50
Malleable, Valley.....	15.50	15.50	15.50	17.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	27.04
Ferromanganese, seab'd car- lots .....	\$75.00	\$75.00	\$75.00	80.00

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

### Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh..	27.00	27.00	27.00	30.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	30.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	30.00
Forging billets, Pittsburgh...	33.00	33.00	33.00	36.00
Wire rods, Pittsburgh.....	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Ske'p, grvd. steel, P'gh, lb....	1.50	1.50	1.50	1.60

### Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.50	1.50	1.50	1.65
Bars, Chicago.....	1.70	1.60	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.55	1.70
Bars, New York.....	1.85	1.85	1.85	1.98
Tank plates, Pittsburgh.....	1.50	1.50	1.50	1.65
Tank plates, Chicago.....	1.70	1.60	1.70	1.70
Tank plates, New York.....	1.798	1.798	1.798	1.93
Structural shapes, Pittsburgh..	1.50	1.50	1.50	1.65
Structural shapes, Chicago....	1.70	1.60	1.70	1.70
Structural shapes, New York..	1.76775	1.76775	1.76775	1.90½
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh..	1.40	1.40	1.40	1.55
Cold-rolled strips, Pittsburgh..	1.90	1.90	1.90	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

### Finished Steel

	Mar. 8, 1932	Mar. 1, 1932	Feb. 9, 1932	Mar. 10, 1931
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.20	2.15	2.15	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill...	2.30	2.30	2.30	2.45
Sheets, galv., No. 24, P'gh...	2.85	2.75	2.75	2.90
Sheets, galv., No. 24, Chicago dist. mill .....	2.95	2.85	2.85	3.00
Hot-rolled sheets, No. 10, P'gh	1.55	1.60	1.60	...
Hot-rolled sheets, No. 10, Chi- cago dist. mill.....	1.65	1.70	1.70	...
Wire nails, Pittsburgh.....	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill..	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.65	2.60
Tin plate, 100 lb. box, P'gh...	\$4.75	\$4.75	\$4.75	\$5.00

### Old Material

Per Gross Ton:				
Heavy melting steel, P'gh....	\$10.25	\$10.25	\$10.25	\$12.75
Heavy melting steel, Phila....	7.37½	7.37½	7.37½	10.50
Heavy melting steel, Ch'go....	7.12½	7.12½	7.12½	10.00
Carwheels, Chicago.....	7.25	7.25	7.50	10.50
Carwheels, Philadelphia.....	10.50	10.50	10.50	13.50
No. 1 cast, Pittsburgh.....	9.75	9.75	10.00	12.50
No. 1 cast, Philadelphia.....	10.00	10.00	10.00	11.50
No. 1 cast, Ch'go (net ton)...	7.50	7.50	7.50	9.50
No. 1 RR. wrot., Phila.....	8.50	8.50	8.50	12.00
No. 1 RR. wrot., Ch'go (net)..	6.50	6.50	6.50	8.00

### Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

### Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	6.50	6.12½	6.62½	10.62½
Electrolytic copper, refinery..	6.25	5.50	6.25	10.00
Tin (Straits), New York....	22.10	21.90	21.75	27.20
Zinc, East St. Louis.....	2.80	2.75	2.85	4.05
Zinc, New York.....	3.17	3.12	3.22	4.40
Lead, St. Louis.....	3.05	3.05	3.55	4.35
Lead, New York.....	3.30	3.30	3.75	4.60
Antimony (Asiatic), N. Y....	6.25	6.37½	6.75	7.05

## The Iron Age Composite Prices

### Finished Steel

March 8, 1932	2.044c. a Lb.
One week ago	2.037c.
One month ago	2.037c.
One year ago	2.142c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

	High	Low
1932 .....	2.044c., March 8;	2.037c., Jan. 19
1931 .....	2.142c., Jan. 13;	2.052c., Dec. 29
1930 .....	2.362c., Jan. 7;	2.121c., Dec. 9
1929 .....	2.412c., April 2;	2.362c., Oct. 29
1928 .....	2.391c., Dec. 11;	2.314c., Jan. 3
1927 .....	2.453c., Jan. 4;	2.293c., Oct. 25
1926 .....	2.453c., Jan. 5;	2.403c., May 18
1925 .....	2.560c., Jan. 6;	2.396c., Aug. 18

### Pig Iron

\$14.48 a Gross Ton
14.48
14.48
15.71

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High	Low
\$14.81, Jan. 5;	\$14.48, Feb. 9
15.90, Jan. 6;	14.79, Dec. 15
18.21, Jan. 7;	15.90, Dec. 16
18.71, May 14;	18.21, Dec. 17
18.59, Nov. 27;	17.04, July 24
19.71, Jan. 4;	17.54, Nov. 1
21.54, Jan. 5;	19.46, July 13
22.50, Jan. 13;	18.96, July 7

### Steel Scrap

\$8.25 a Gross Ton
8.25
8.25
11.08

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High	Low
\$8.50, Jan. 12;	\$8.25, Feb. 9
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3
16.50, Dec. 31;	13.08, July 2
15.25, Jan. 11;	13.08, Nov. 22
17.25, Jan. 5;	14.00, June 1
20.83, Jan. 13;	15.08, May 5

# Pittsburgh, Valley and Wheeling Output Gains as Steel Releases Improve

PITTSBURGH, March 8.—Finished steel releases in this district improved slightly last week in spite of the almost complete absence of specifications from the automobile industry. Miscellaneous consuming lines accounted for most of the gain, although improvement was specifically reported from the electric refrigerator manufacturers, makers of steel barrels and drums and others. Inquiry for structural steel and reinforcing bars is also heavier, and indications of more buying by the railroads are apparent.

These circumstances have led to marked improvement in sentiment, which will be given further impetus in the next week or two by the expected placing of automobile tonnage.

Strengthening of the steel price structure is also a definitely constructive influence which will make itself felt more conclusively as the month progresses. Sheet prices are beginning to be tested, and small orders are being taken at the higher figures announced about a month ago. On bars, plates and shapes, all new quotations are being made on the basis of 1.60c., Pittsburgh, and, while confirming sales are lacking, the market is theoretically placed on the higher level. Evidence that steel producers are much more determined than usual to stabilize and advance prices is offered by reports that attractive tonnages have been turned down by steel companies in several cases when buyers were unwilling to pay the higher figure.

Steel ingot production in the Pittsburgh district has again risen slightly and stands at 26 per cent of capacity. The larger companies have been able to maintain last week's schedules, and gains have been made by some of the smaller producers. A steel works blast furnace has resumed production. Valley steel production has also gained slightly to about 30 per cent, while production in the Wheeling district has risen to 40 per cent after a temporary setback.

Finishing mill schedules show no marked change, although tin plate production is higher, and wire mill schedules are up slightly. Sheet and strip production is still intermittent.

The scrap market has gained strength as the result of comparatively heavy purchases by the leading interest in the district.

Despite absence of important buying by automobile companies, steel releases have gained.

\* \* \*

Stabilization of prices a constructive influence that is likely to be felt as month progresses.

\* \* \*

Bars, shapes and plates now firmly quoted at 1.60c. a lb., Pittsburgh.

\* \* \*

Purchase of about 20,000 tons of scrap by leading consumer strengthens market.

▼ ▼ ▼

## Pig Iron

The market shows no appreciable change, but the foundry melt in the district is scarcely equaling February averages. An independent steel company has placed a small tonnage of Bessemer iron, which will be delivered by water. The price was not revealed, but is said to have been considerably under the current quoted schedules. No activity is reported in the Valleys, and sales to test quoted prices are generally lacking.

## Semi-Finished Steel

Shipments show little change from the February rate, and new business is light, reflecting the intermittent operations of non-integrated sheet and strip mills. Prices are not clearly defined, as some makers are quoting \$26, Pittsburgh, on sheet bars, as well as on large billets and slabs. On forging billets the minimum price seems to be \$33. Wire rods are well maintained at \$37, makers having opened their books for second quarter at this price.

## Bolts, Nuts and Rivets

Manufacturers are seeking second quarter contracts for bolts at 75 per cent off list, and a little tonnage has been placed at this discount. However, makers still have much low-priced business on their books, which will have to be specified before the market becomes entirely established at the higher level. Demand is very

light and mill operations range from 15 to 20 per cent of capacity.

## Rails and Track Supplies

Little new business has actually come out, although makers of rails and accessories are more hopeful that a limited amount of tonnage will come out in the near future. Operations are very light and depend entirely upon releases from week to week.

## Bars, Plates and Shapes

Inquiry for building steel continues to show improvement. Awards are still rather light, but sufficient tonnage is coming out for bids to assure a better volume of business before the end of the month. Otherwise, demand for heavy hot-rolled products shows little change, with bars particularly inactive because of light demand from the automobile industry. The plate business is also dull, as the leading consumers are generally dormant. Demand for river craft is confined almost entirely to Government projects.

The 1.60c., Pittsburgh, price which has been named for second quarter has not been tested by any significant buying, but quotations at lower figures are entirely lacking.

## Cold-Finished Steel Bars

Makers have reaffirmed the present price of 2c., Pittsburgh, for second quarter, although they are not actively soliciting advance tonnage at this figure. On current small lots this price is well maintained in this district. Business shows little change from February from the standpoint of volume.

## Tubular Goods

A slight increase in demand for standard pipe is reported, but seasonal impetus is lacking. Mills are shipping less pipe on consignment than usual, and distributors' stocks are being kept very low. No activity has developed in the line pipe market, and demand for oil country goods is very light. Mechanical tubing is slightly more active, and movement of boiler tubes is steady.

## Wire Products

Miscellaneous releases are somewhat heavier. Aggregate tonnage thus far in the month shows a slight improvement over that of February.

This is particularly true in the case of merchant products, as manufacturers' wire continues very quiet. Although books have been opened at 2.20c., Pittsburgh, for manufacturers' wire, and \$1.95 a keg for nails, very little advance business has been placed.

#### Sheets

Sufficient tonnage has been placed during the last week to establish prices named recently on some finishes of sheets, particularly hot-rolled annealed light and heavy cold-rolled, automobile body sheets and galvanized sheets. Old quotations at lower figures have not been entirely withdrawn, but the higher prices have been named on all inquiries made in the last two weeks. As a result, the market on hot-rolled annealed sheets is now quoted at 2.20c., Pittsburgh; heavy cold-rolled at 2.25c.; light cold-rolled at 2.75c.; automobile body at 2.90c.; galvanized at 2.85c., and hot-rolled at 1.60c. Buying by the automobile industry is exceptionally light, and the absence of purchases by the Ford Motor Co. has led to hold-ups by some of the other motor manufacturers. Nevertheless, miscellaneous demand for sheet steel is gradually improving, a particularly bright spot being the electric refrigerator industry. There is also a better demand for electrical sheets, the price of which was recently revised downward. The Commonwealth of Pennsylvania will take bids March 17 on 800 tons of license plate stock, with rather unusual specifications.

#### Warehouse Business

Sales of steel products out of warehouse, which held their own during February, have already shown some improvement this month. Structural shapes and reinforcing bars are moving a trifle better, and more interest is being shown in bolts, pending a price advance April 1. Prices generally are well maintained, with wire and nails holding unusually well. Nails are now quoted at \$2.35 a keg and plain wire at 2.75c. a lb.

#### Tin Plate

Specifications continue to show limited improvement, and production in the industry as a whole is well over 40 per cent of capacity. Some producers are still making material for stock, although shipments have been heavy enough recently to enable some of them to reduce their inventories.

#### Strip Steel

Makers of hot-rolled strip have opened their books for second quarter with a \$2 a ton advance over recent quotations. This makes strip 6 in. and narrower 1.60c., Pittsburgh, and the wider material 1.50c. Little tonnage has been booked at the new prices, and the same might be said for cold-rolled strip, which is quoted for second quarter at 2c., as compared with 1.90c. on recent spot business. Releases

generally are still rather light, but show a tendency to improve, particularly in miscellaneous lines.

#### Coke and Coal

Colder weather has stimulated demand for heating coke, but the other grades are quiet. The foundry melt is still very light in this district, and prices are weak on some transactions. The foundry grade is still quoted at \$3.25 to \$4.50, Connellsville, while furnace coke is holding at \$2.25.

#### Old Material

The placing of upward of 20,000 tons of heavy melting steel by a large buyer last week at \$10.25 and \$10.50 has established the market at recent

levels, which had begun to show signs of weakness. Prices paid were the same as those named about six weeks ago, when the company last made a purchase. Hydraulic compressed sheets have also been bought at \$10.25, an advance of 25c. a ton over recent levels. Machine shop turnings and blast furnace scrap are also stronger. Carwheels are off slightly as the result of the sale of the last Pennsylvania Railroad list. One important scrap consuming point is again taking shipments, following several weeks of suspension. In spite of the improved sentiment in the trade, there is little prospect of further advance in scrap prices in the near future.

## Pacific Coast Prices Undergo Stabilization; Foreign Tin Plate Shipments Being Received

SAN FRANCISCO, March 7.—A new price schedule has been announced to apply on mill shipments of bars, plates, shapes and sheets, in an effort to stabilize the price situation on the Pacific Coast. Although the new prices do not represent a material change, it is expected that they will be more rigidly adhered to than were the prices formerly in effect, which had been subject to frequent concessions. The new prices are as follows, c.i.f. Pacific Coast ports: soft steel bars, 2c.; tank plates, 1.85c.; standard shapes, 2c.; wide flange shapes, 2.10c.; No. 24 hot-rolled annealed sheets, 2.80c.; No. 10 hot-rolled sheets, 2.30c.; No. 24 galvanized sheets, 3.45c.; reinforcing bars, 2.10c.

During the past month pig iron prices have dropped considerably, and the current quotation on No. 3 Utah base is at \$14.50 a gross ton at furnace, Provo, Utah, and \$19 at Pacific Coast ports.

Tin plate from the United Kingdom is being received in quantity on the Pacific Coast for the first time, due to the decline in British exchange and the credits held in London for Pacific Coast fruit and fish packers. A shipment of 3000 tons was reported received on the Royal Mail motorship Lochgoil during the current week, for distribution among California and Washington ports.

Major projects placed during the past week aggregated 3500 tons of bars, shapes and plates, with new inquiries received that will require 14,500 tons. Of the latter, 12,700 tons was involved in pipe and tank projects for plates. The contemplated line of the Pacific Gas & Electric Co. to supplement its present main from Milpitas to San Francisco will require from 9000 to 12,000 tons, for 42 miles of 26-in. pipe.

Cast iron pipe projects to be opened and placed in California during the next 15 days involve approximately 2000 tons.

The market on reinforcing bars continues demoralized in southern California, and the price is open on both erection and out-of-stock requirements of any size.

## Reading Iron Co. Issues House Organ

The first of a series of articles on "The Story of Puddled Iron," showing ancient as well as modern uses of that material, features Vol. 1, No. 1 of the *Reading Puddle Ball*, a new house organ published by the Reading Iron Co., Reading, Pa.

The initial number contains 10 pages, 6 x 9 in., printed in color. Articles are brief and are attractively presented; they include an account of puddled iron pipe removed from a "skyscraper" demolished after 46 years of service, and the use of charcoal iron boiler tubes in the "Rocket," one of the first locomotives built for the Reading Railroad. An article on "Life Among the Models" describes and illustrates the company's policy of using for its advertising photographs non-professional models in actual backgrounds rather than professional models and artificial sets.

In a brief statement, P. N. Guthrie, Jr., president of the company, relates an early experience with a section of a 20-in. wrought iron gas pipe line, which when reclaimed after seven or eight years service was found to be still "blue." The pipe was relaid as a section of another line and is still in service, some 40 years after.



# Chicago Iron and Steel Markets Continue at a Dead Level

▲ ▲ ▲

**C**HICAGO, March 8.—The local iron and steel market continues its course at a dead level. Specifications for finished steel are varying little from week to week, but releases for pig iron continue to show gradual improvement. New sales in all sections of the market are sluggish, though a slight upward swing is noticeable in wire products and sheets.

The move to hold prices and even advance some quotations is taking a firmer foothold. Sellers are solidly back of 1.70c. a lb., Chicago, for plates, shapes and bars, and present wire prices are being carried forward into the second quarter. Stabilization of pig iron prices seems nearer at hand. Some reinforcing bar dealers are to ask more for their offerings.

So far as industry as a whole is concerned, there is little change. Roofing manufacturers are somewhat more busy, and builders of road machinery and industrial tractors have heavier schedules in anticipation of the resumption of road construction. Malleable iron foundries are coming more freely into the market for small lots of scrap and pig iron. Operations are reported to be better at a few steel casting units. From time to time much has been said of improved sentiment, but usually this change in attitude has been shortlived. Once again it is possible to note improved sentiment, with the difference this time that the change is holding over a longer period and in fact seems to be gathering strength. A slightly better tone is noted among automobile manufacturers. Nash reports that reception of its new models was above expectations. Studebaker is planning higher production of the Rockne car. Releases by Ford in this district remain very light.

## Pig Iron

Releases of Northern foundry iron are about 10 per cent heavier than at the end of the first week in February, and sellers are still inclined to believe that shipments in March will continue to gain slowly. New sales are slow, but inquiries are tending to increase, especially under the influence of second quarter requirements. Prices are still somewhat on nominal basis, though there is a growing inclination to bolster this phase of the market. Charcoal iron is moving faster both in releases and new sales, the latter in February having been the best in 12 months. Southern iron

**Pig iron releases showing slight improvement, but steel business is not.**

\* \* \*

**In general, the Chicago market remains at the level of recent weeks.**

\* \* \*

**Movement to stabilize prices is taking a firmer foothold.**

\* \* \*

**Sentiment is somewhat better in the automobile industry.**

▼ ▼ ▼

is moving north in small quantities at \$10, Birmingham.

## Bolts, Nuts and Rivets

Sellers are preparing contracts for the second quarter at the new price levels.

## Reinforcing Bars

Prices in this market appear to be holding. Several inquiries, now open for four or five weeks, are still unclosed because of contractors' inability to break through existing price levels. Rail steel reinforcing bars are quoted at 1.55c. to 1.65c. a lb., depending on the size of the inquiry. Mild steel bars are holding at 1.75c. a lb., minimum. Both fresh inquiries and sales are in small volume.

## Warehouse Business

After four weeks of decline in orders, Chicago warehouses find that the trend has been reversed. The change is sufficiently abrupt to regain about one-half of the ground lost last month. Most of this improvement is in city trade. Prices remain steady on regular lines.

## Cold-Rolled Strips

Prices range from 1.90c. to 2c. a lb., Cleveland, the higher figure being sellers' quotation for second quarter delivery. Demand remains sluggish.

## Rails and Track Supplies

Formal orders for rails from the Erie and the Nickel Plate are now entered on producers' books, and releases are expected at an early date. In the meantime, rail production is off, with no tonnage being rolled this week by local mills. A few miscellaneous releases are at hand, and it is

probable that one of the mills here will roll next week. Railroads are known to be working on rail requirement programs, but the time of entering orders is an unanswered question. More releases have come in for track supplies, and output by these departments is well sustained.

## Plates

Chicago producers have all adopted 1.70c. a lb. on plates. The proof of price stability rests with a run of small orders that are characteristic of the present market. Local pipe mills are all but idle, but look rather hopefully to a revival of interest when open weather will permit pipe-laying operations.

## Structural Material

Fresh inquiries are holding up well, but awards are off rather sharply. The bulk of new projects is for bridge work in Midwestern States, though there is 900 tons in a medical arts building at Duluth, Minn. A small gain is noted in specifications for plain material, but active projects do not bulk large and substantial growth in releases cannot be expected in the near future. Producers are asking 1.70c. a lb., Chicago, for structural material.

## Sheets

Sheet production is turning upward, but the change so far is small and is barely discernible in operations, which are intermittent. Several units did not start until Wednesday. Road builders are beginning to inquire for center strips, and roofing manufacturers are finding some more use for sheets. The jobbing trade is quiet.

## Cast Iron Pipe

Outstanding among awards this week are tonnages placed by Fort Wayne, Ind., and Minneapolis, Minn. Inquiries are small. Odd lots up to a car in size are more frequently in the market. Cast iron pipe 6 in. in diameter and larger is being sold at \$30 to \$32 a ton, Birmingham, or \$38.40 to \$40.40 a ton, delivered Chicago.

## Bars

Specifications and sales of mild steel bars are near recent averages, though slightly larger quantities are going for building use. Ford's moves are still unknown to the trade. Most automobile manufacturers are pursuing

a cautious policy. Road machinery and industrial tractor plants are stepping up production as they prepare for spring road building activities. The rail steel bar market is quiet.

#### Wire Products

The recent small increase in demand is still in evidence, though accumulating orders are still too light in the aggregate to make a real impression on operations. Much of the improvement in demand is coming from the manufacturing trade. Most specialties made by wire producers are dull.

#### Old Material

It is quite evident that some dealers are more anxious to sell, and, with the market still very sluggish, there is some speculation as to whether present levels of prices can hold. An interesting development is the narrowing of dealers' profits, the usual figure now being 25c. a ton instead of 50c. Inquiry for small lots is slightly larger.

### Buffalo Foundries Get Larger Orders

BUFFALO, March 8.—Pig iron producers see encouragement in the fact that some of the larger district foundries have obtained increases in orders, which will mean somewhat heavier schedules for the next few weeks. No automobile business is as yet involved. Pig iron shipments in February were above those of January, and output was somewhat over 10 per cent better.

#### Steel

Four open-hearth furnaces are in operation at the Lackawanna plant of the Bethlehem Steel Corp. Republic Steel started four furnaces last Friday and expected to continue all this week. Wickwire Spencer is operating one. The Seneca Iron & Steel Co. and the Buffalo Bolt Co. are running at about 30 per cent.

#### Old Material

A sale of short shoveling turnings to a Niagara Frontier point at between \$7.25 and \$7.50, delivered, is noted. No other sales are reported. There is a scarcity of stove plate, No. 1 machinery cast and borings and turnings. It is somewhat difficult to fill old orders of this material. Some distress selling among dealers has taken place, one of these transactions being a sale of No. 1 heavy melting steel at \$6.75. The largest consumer is reputed to have scrap valued at about \$1,000,000 in its yards here.

Foot Brothers Gear & Machine Co., Chicago, has been awarded contracts for furnishing machined castings and operating machinery for the Illinois Waterway bridges at Joliet.

## Eastern Pennsylvania Trade Shows No Marked Change

### Steel Releases a Little Better, but Operations Have Not Improved —Some Railroad Buying Expected

PHILADELPHIA, March 8.—Although the markets continue to lag and some of them are listless, the improved sentiment in the trade is still evident. The hope that this feeling will be translated into actual business at stabilized and profitable prices is partially buoyed up by reports that at least two important railroads are planning to come into the market soon for rolling equipment. The trade is also awaiting with interest sizable purchase by the Ford Motor Co. in connection with its large 1932 program. So far no orders from that company have been placed in this district.

There has been a slightly better volume of releases of plates, shapes and bars by miscellaneous consumers. The effort to move up prices is said to have stimulated specifications to a smaller degree; this is also true of sheets.

Operations are unchanged.

#### Pig Iron

Two nearby melters are inquiring for foundry iron, one asking for 300 tons of No. 2X and the other for 225 tons of No. 2X and No. 2 plain. Another consumer in this district is reported to have closed on an inquiry for 1000 tons of foundry grades. Most inquiries and sales are confined to carlots. Prices are unchanged.

#### Plates, Shapes and Bars

The trade is interested in a report that two important railroads are planning to scrap considerable obsolete rolling equipment, including locomotives and cars and will replace it with new stock. There is a better feeling also, based on reports that the carriers are showing signs of increased interest in the market. They have not indicated, however, when they will place long overdue orders. It is believed they cannot much longer delay buying some requirements, including rails. At the same time a really heavy buying movement by the railroads does not appear to be in prospect before the last half.

#### Sheets

The increased second quarter prices have developed a few specifications against old contracts. Customers are protected for the second quarter to April 1 at the old prices, but new business is quoted at the advanced levels. Interest is shown in the fact that a few inquiries have come to mills asking for extension of second

quarter quotations for the third quarter and for guarantee against price advances and declines. Makers, however, are refusing to quote beyond the second quarter. Not enough business has been taken for the second quarter to test the new levels.

#### Warehouse Business

March has started out even more poorly than February did. Jobbers report that orders are few and light. No change has been made in quotations.

#### Imports

Importations last week were: Pig iron from British India, 199 tons; steel bands from Germany, 26 tons; galvanized steel strips from England, 14 tons; structural shapes from Belgium, 303 tons.

#### Old Material

The market is extremely dull. Mills are showing little or no interest either by way of inquiries or releases.

### Canadian Business Is Showing Minor Gains

TORONTO, March 7.—Minor changes along the road to improvement continue to appear in the Canadian iron and steel industry, but so far these have not been reflected in a general expansion of plant operations. In the pig iron market business is holding at a fair level, with melters adhering to hand-to-mouth buying. Pig iron production has shown a slight gain during the past week owing to increased activities at the Algoma Steel Corp. plant. Imports continue light. Prices are unchanged.

#### Old Material

This market shows little change. Sales of special grades are holding up, but steel scrap is stagnant. Dealers state that they have had no opportunity to test prices recently.

In the compilation of February pig iron production in THE IRON AGE of March 3, it was erroneously stated that the furnace of the Jackson Iron & Steel Co., Jackson, Ohio, had been blown out, whereas it had merely been banked.



# Cleveland Ingot Output Gains, Ford Releases Still Awaited

Price Stabilization Movement Progresses as Producers Quote  
1.60c., Pittsburgh, on Bars, Plates and Shapes

CLEVELAND, March 8.—Steel business so far this month has held to about the same volume in this territory as during the corresponding period in February. Orders are still for small lots. Inquiry for some products has gained, largely from manufacturers who are figuring on inquiries for automobile parts. Sentiment in the trade shows an improvement, which evidently is largely due to the expectation that the Ford Motor Co. will soon get under production and require a great deal of steel. Steel producers and automobile parts manufacturers are still waiting releases from the Ford company. The sheet market is very dull because of the absence of orders from this company and little new buying by other motor car manufacturers; production by some of the Ohio mills was curtailed this week.

Steel plant operations in Cleveland were increased this week by the starting of an additional open-hearth furnace by the American Steel & Wire Co., which is now operating six of its seven furnaces. There are 14 local open-hearth furnaces operating, or 41 per cent of ingot capacity.

While the recent price advances on steel bars, plates and shapes have been tested only on small-lot orders, these having been taken at the higher prices and producers appear determined to adhere to the advances. Two makers have announced the present 1.40c. and 1.50c. prices on hot-rolled strip for large buyers for the coming quarter, but several producers have not yet named prices for that delivery. Additional producers have reaffirmed present prices on wire products and cold-finished steel bars for the coming quarter.

## Pig Iron

Sales were light the past week and little inquiry is pending. While a few second quarter contracts have been closed, not much interest is shown in iron for that delivery. Shipments so far this month have not gained over those of February. Round-lot releases from the Ford Motor Co. for malleable castings, which have been looked for, have not materialized. Prices are unchanged at \$15, Cleveland, for foundry and malleable iron for outside shipment and \$16, furnace, for local delivery.

## Iron Ore

No interest is being shown as yet in the iron ore market for the coming season and little, if any, considera-

tion has been given to prices. The Ford Motor Co., which is usually the first to enter the market for its ore requirements, has not yet sent out its inquiry. Shipments from Lake Erie docks continue very light. These amounted to 42,954 tons in February, compared with 169,250 tons in the same month last year. The balance on Lake Erie docks March 1 was 5,767,060 tons, compared with 6,011,374 tons on the same date a year ago.

## Strip Steel

The uncertainty as to second quarter prices for hot-rolled strip appears to have been removed by the announcement by two producers that they have adopted for that delivery the present prices of 1.40c. for wide strip and 1.50c. for narrow for large buyers. Two other mills recently named these prices for the second quarter, but later withdrew them. Demand in the past week increased through some good orders from manufacturers of automobile lamps and other accessories. Cold-rolled strip remains quiet. This material is firmer and the 2c., Cleveland, price is now being generally quoted for the second quarter.

## Bolts, Nuts and Rivets

While small lots of bolts have been sold at 75 per cent off list, the price advance has as yet been given little test. Makers this week sent out their contract blanks for the second quarter and these are expected to show how much resistance there is to higher prices. Orders are fair from the motor car industry, but very slow from other sources. Rivet makers have not yet announced second quarter prices.

## Sheets

Orders were light the past week and afforded little test of higher prices. While the new prices are being generally quoted, many consumers are under contract at the old prices and some of the mills are willing to accept shipments against these contracts through March and for deliveries extending through April. The advance to 2.20c. on hot-rolled annealed sheets appears to be maintained. Electrical sheets have been reduced \$10 a ton for all grades following extreme price irregularities. Delay in the release of orders for Ford parts is affecting operation of stamping plants. The refrigerator industry continues to take a good ton-

nage, but very little business is coming from stove, barrel and metal furniture industries.

## Bars, Plates and Shapes

The only sizable structural job awarded during the week was a grandstand in Columbus taking 600 tons of steel. Little new building work is coming out. Lake shipyards have an inquiry from Chicago for a scow that will take 700 tons of plates. The 900 tons of sheet piling required for the Pymatuning, Pa., dam probably will be placed this week. The new prices of 1.65c., Cleveland, for steel bars and 1.60c., Pittsburgh, for plates and shapes are being held on all new business, although these have not been given much of a test, because most consumers are under contract for the quarter at \$2 a ton lower.

## Old Material

Some new demand from consumers that was looked for this month has not yet materialized. Prices show little change. Small lots of heavy melting steel are being purchased by dealers for delivery to a local mill at \$7.50 to \$7.75, but somewhat lower prices are being paid for material for shipment to the Valley district. Mills are accepting very little scrap.

## Cincinnati Sales of 5,000 Tons of Southern Iron

CINCINNATI, March 8.—Except for the sale of 5000 tons of Southern foundry iron to a southern Ohio consumer, the district pig iron market the past week was quiet. This tonnage, the first of size to test Southern prices in some time, indicates that \$10, base Birmingham, is firm, and furnaces are not prone to grant concessions. Increased competition from other districts is tending to weaken quotations on Northern iron, current bookings being made on a spread which figures about \$17.01 to \$17.59, delivered in Cincinnati. The melt is without appreciable change, foundries operating only a few small heats a week. The trade is without substantial pending business.

## Old Material

Light shipments of scrap to district mills continue, but new business is negligible. Prices are nominal.

Bunting Brass & Bronze Co., Toledo, Ohio, is celebrating its twenty-fifth anniversary in business. Founded in 1907 by William Bunting, the company has engaged extensively in research and experimental work in connection with bronze alloys and their uses, and in collaboration with the United States Bureau of Standards and other associates has contributed many important facts relating to bronze bushings, bearings and parts.



## Valley Mills Firmly Quoting New Steel Prices; Ingot Output Is Making Slight Gain This Week

YOUNGSTOWN, March 7.—With no significant change in the rate of steel specifications reaching Valley mills, attention of local steel producers is concentrated on price stabilization. Practically all of them have named minimum quotations on the leading finished steel products, and determination to hold the figures named seems to be more sincere than at any time in the last two years. One of the larger companies is known to have definitely turned down forward tonnage offered at prices under the present schedules, and the failure of the Ford Motor Co. to place significant tonnage in the district is partially attributed to price difference. However, the Ford interests have a number of sources of supply in the district which would hardly be ignored in the placing of large orders even though producers insisted on a fair price. A little Ford business has been placed, but it will hardly affect steel production in the district during the current week.

Steel ingot output has regained some of the ground lost two weeks ago and is again approaching 30 per cent of capacity. The leading interest is about 40 per cent active in the Valleys; improved production schedules in Shenango Valley tin mills are contributing to the gains. A strong demand for bars is also developing. Blast furnace activity is at the highest rate in several months, and, with pig iron stocks at a minimum, the current rate may easily be continued throughout March. Sheet and strip mill production is still intermittent, but a number of the many units which were idle last week have again resumed production on accumulated orders. The smaller non-integrated mills are no longer able to secure large concessions on semi-finished steel and will probably be forced to pass up low-priced business.

Bars and plates are now generally quoted in the Valleys at 1.60c., Pittsburgh, and a little tonnage has been booked at this figure. The leading Cleveland producer of bars has established a minimum price of 1.65c., Cleveland, thus clarifying the position of Valley mills. Billets, slabs and sheet bars are now quoted at \$27, Youngstown, and reports of an advance for second quarter are heard. Prices on wire products are stable, with second quarter books now open at unchanged levels. No changes in steel pipe prices have been made, and the market is well maintained. Ton-can iron pipe is well established at the recent reduction.

On flat-rolled products the price situation is becoming clarified, with the minimum prices named recently gradually being tested by small orders. It is emphasized, however, the current quotations are still unprofitable

and that further advances are in prospect as soon as current levels can be fully established. Advances will naturally be slow in realization because of the reluctance of consumers to take out tonnage on old contracts, but this business will probably be canceled if not specified within a reasonable length of time.

The raw material markets are quiet, but prices are unchanged. Valley merchant pig iron producers have made no significant sales under the current price levels, although Bessemer iron has been sold at lower figures in nearby districts where Valley producers do not ordinarily compete. Scrap prices are unchanged, although stronger than two weeks ago.

## Alabama Blast Furnace Operation the Lowest Since 1921 Excepting Few Days Last December

BIRMINGHAM, March 8.—Only five blast furnaces are now in operation in Alabama, two furnaces having been banked last week, these being Ensley No. 4 and Ensley No. 6 of the Tennessee Coal, Iron & Railroad Co. The banking of these furnaces accompanied the rail mill stoppage. The present number of active stacks is the lowest since the summer of 1921, with the exception of a few days during last December, when there was also only five. Two other changes took place last week. Ensley No. 3 of the Tennessee company was switched from basic iron to foundry iron. Woodward No. 2 of the Woodward Iron Co. was banked and Woodward No. 1 was taken off bank and placed in production. The active stacks are No. 2 of Sloss-Sheffield on foundry; No. 1 of Republic Steel on foundry; No. 1 of Woodward Iron on foundry; Fairfield No. 6 of Tennessee company on basic and Ensley No. 3 on foundry. Sales show no improvement. Most of the new tonnage is still for immediate shipment. District quotations are being maintained at \$11.

### Steel

Bookings last week by the two manufacturers of steel in this district were lighter than for some time past. Demand is tending to become spotty and irregular. Mill schedules are being varied from week to week, dependent on bookings. An advance of \$1 a ton was announced for bars, plates and structural shapes, quotations now being 1.75c. Structural steel awards are still generally small and scattered, with occasional exceptions. Virginia Bridge & Iron Co. booked considerable new tonnage during the past 10 days, several contracts giving an aggregate of more than 1500 tons. Ingalls Iron Works is low bidder on a dredge for the United States Engineers at Galveston, Tex. This will require about 500 tons. The Ensley rail mill of the Tennessee company, which was shut down last week, will be reopened about April 4, according to present plans. Open-hearth operations have been reduced to six furnaces, the Tennessee com-

pany operating four at Fairfield and Gulf States Steel continuing with two at Alabama City. The Ensley open-hearth plant was shut down last week.

### Old Material

Last week one of the steel companies and a foundry placed orders for their estimated March requirements. This was about the only activity in the market. Other foundries are limiting their specifications on contracts, with the result that shipments are still rather small. Prices are unchanged.

## Detroit Scrap Prices Show Firmer Trend

DETROIT, March 8.—Although there has been a notable scarcity of orders from consumers, scrap prices have been supported by purchases by local dealers desirous of acquiring material in anticipation of a market recovery. Steel plant and blast furnace items are especially strong, with sheet clips up 25c. a ton. The local trade is waiting on Ford Steel releases for a renewal of interest in scrap buying on the part of users.

Pittsburgh-Des Moines Steel Co., Pittsburgh, and borough of Ambridge, Pa., which are jointly conducting tests of paints for water tank interiors, report that results of the fifth inspection of 196 paint panels after 130 days' exposure showed the following five groups as having the highest average ratings: hot bituminous coatings, 98.9 per cent; red lead and linseed oil, 89.7 per cent; aluminum paints, 88 per cent; asphalt emulsions (plain), 86 per cent, and thick plastic coatings, 85.2 per cent.

About 2000 men will be added during March to the payroll of the Ford Motor Co. assembly plant in Chicago. There are now about 1000 men employed at this assembly unit.

# New York Steel Buyers Show More Interest in the Market

**Tonnage Has Not Perceptibly Increased, But Improved  
Sentiment Continues—Price Stabilization Grows**

NEW YORK, March 8.—Consumers and jobbers are manifesting somewhat more interest in the market, but this has not been reflected in tonnage to any extent. Whether this interest is a result of an improvement in underlying conditions or has been fostered by the price stabilization movement now going on is difficult to determine, but it is likely that both factors are having an influence.

Sheet manufacturers, who took the first stand for higher prices, have, to a large extent, established the new levels, at least on the common grades of sheets. Some business has been done at the advances, and the former quotations are pretty well out of the picture. Many buyers are, of course, covered through March at the old prices, and it is expected that there will be liberal specifying against these contracts at the end of the month. Some forward buying may also be stimulated by the passage of the sales tax law, which will not go into effect until 30 days after it has been signed by the President, thus giving a brief opportunity for an escape from the tax.

The advance to 1.60c., Pittsburgh, on bars, plates and shapes, initiated by Pittsburgh mills, has not been adopted by all plate mills, but it seems to be a general quotation on bars and shapes. Owing to contract coverage, the new price still awaits a test, no sales having been reported at higher than 1.50c.

Makers of strip steel have joined the price stabilization movement. Apparently two sets of prices have been announced on hot-rolled strip for second quarter, some mills having announced the present quotations of 1.40c. on wide and 1.50c. on narrow, but others are quoting \$2 a ton higher. The minimum quotations will probably apply on the larger tonnages, and an effort will be made to obtain a \$2 a ton extra for small lots. Some mills have advanced cold-rolled strip steel to 2c. for second quarter.

The Irak oil line, which will run from the Persian fields to the Mediterranean, probably will take about 150,000 tons of pipe, instead of the 250,000 tons mentioned last week. Not more than a third of this tonnage is expected to come to American mills.

## Pig Iron

Although the flow of orders in the past week reflected a slightly better demand than in the previous week, the volume of business continues to

be relatively small. Total bookings last week, at 2500 tons, compare with 2000 tons a week ago and 2500 tons two weeks ago. Round-lot buying for forward delivery is virtually absent. Foundry operations are sluggish, and, in spite of generally low inventories, consumers are content to await more tangible business prospects before covering beyond their imperative

## St. Louis Pig Iron Shipments Running Ahead of Those of February; Steel Trade Dull

ST. LOUIS, March 8.—While new business in pig iron the past week was exceedingly small, shipments against contracts are being well maintained. Shipments of the St. Louis Gas & Coke Corp. thus far in March are reported to be ahead of those in the same period in February. Neither the implement nor stove trade is doing much. Prices are unchanged.

## Finished Steel

It was stated in this column last week that "a leading Eastern mill had notified its representatives here to withdraw all concessions below 1.60c., f.o.b. Chicago." The figure should have been 1.60c., Pittsburgh. A leading Chicago mill is expected to announce new second quarter prices of 1.70c., f.o.b. there, on plates, shapes and bars.

One district open-hearth furnace was down last week for repairs, but is now again in operation. The district operations are about 14 per cent of capacity.

Building operations await a downward readjustment of wages in the building trades. Fabricators of structural steel are said to be operating at about 20 to 25 per cent of capacity.

## Old Material

Dealers expect that mills will come into the market for scrap some time this month, as mill stocks, with one or two exceptions, are quite low. No. 1 busheling and rails for rolling are 25c. a ton lower, cast iron car wheels are 50c. off and iron car axles are 75c. less.

Railroad lists: Baltimore & Ohio, 3955 tons; Wabash, 937 tons; Chicago, Milwaukee, St. Paul & Pacific, and

needs. Although foreign offerings have intensified competition, bookings of imported iron have been comparatively small in view of the fact that practically all orders are for quick delivery. Buffalo and eastern Pennsylvania irons are still quotable at \$14.50 to \$15 a ton, furnace, and foreign iron is available at about \$15 a ton, duty paid, ex-ship at New York.

## Reinforcing Bars

Prices are firmly held at 1.50c., Pittsburgh, or 1.85c., delivered, New York. New building projects are few and usually involve only small lots of reinforcing material. Public works programs are still retarded by lack of funds. The only sizable award in the past week was to Concrete Steel Co. for 380 tons for the Brooklyn State Hospital buildings.

New York, Chicago & St. Louis, 50 carloads each, and Chicago, Rock Island & Pacific, 11 carloads.

## Freight Rate Decisions

The Interstate Commerce Commission has authorized railroads to establish rates on scrap iron and steel between points in Southern territory, including St. Louis group and intermediate points, without observing the long-and-short-haul provision. The commission accepted a 1500-mile scale proposed by the carriers, though they expressed the view that there is slight probability of movement for distances over 860 miles. The scale was accepted with certain provisions as to so-called "circuitry" routes, etc.

American Society of Mechanical Engineers-American Society for Testing Materials joint research committee on the effect of temperature on the properties of metals has perfected plans for sponsored research during 1932 at the Engineering Experiment Station, University of Illinois, Urbana, under direction of Prof. H. F. Moore, and at Battelle Memorial Institute, Columbus, Ohio, under direction of Dr. H. W. Gillett.

Sales by Foote Brothers Gear & Machine Co. for February were 10 per cent higher than in January, according to a statement by F. H. Fowler, president. Interest in the company's products indicates that March sales may climb to a still higher figure.



# Prices of Finished and Semi-Finished Steel,

## BARS, PLATES, SHAPES

### Iron and Steel Bars

#### Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
Del'd Philadelphia.....	1.81c. to 1.91c.
Del'd New York.....	1.85c. to 1.95c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
F.o.b. Birmingham.....	1.70c. to 1.75c.
C.i.f. Pacific ports.....	2.00c.

#### Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths.....	1.75c.
F.o.b. Cleveland.....	1.50c. to 1.55c.

#### Rail Steel

F.o.b. mills, east of Chicago dist.....	1.30c. to 1.35c.
F.o.b. Chicago Heights mills.....	1.50c. to 1.60c.
Del'd Philadelphia.....	1.49c. to 1.59c.

#### Iron

Common iron, f.o.b. Chicago.....	1.70c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.11c.
Common iron, del'd New York.....	2.15c.

### Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.70c. to 1.75c.
Del'd Cleveland.....	1.7035c. to 1.8035c.
Del'd Philadelphia.....	1.6935c. to 1.7435c.
F.o.b. Coatesville.....	1.60c. to 1.65c.
F.o.b. Sparrows Point.....	1.60c. to 1.70c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
Del'd New York.....	1.798c. to 1.898c.
C.i.f. Pacific ports.....	1.85c.

### Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.50c. to 1.60c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.70c. to 1.75c.
F.o.b. Lackawanna.....	1.60c. to 1.70c.
F.o.b. Bethlehem.....	1.60c. to 1.70c.
Del'd Cleveland.....	1.7035c. to 1.8035c.
Del'd Philadelphia.....	1.5995c. to 1.6495c.
Del'd New York.....	1.76775c. to 1.86775c.
C.i.f. Pacific ports (standard).....	2.00c.
C.i.f. Pacific ports (wide flange).....	2.10c.

### Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh.....	1.90c.
F.o.b. Chicago mill.....	2.05c.
F.o.b. Buffalo.....	2.00c.

### Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	Alloy Differential per 100 Lb.
S.A.E. Series Numbers	
2000 (1% Nickel).....	\$0.25
2100 (1 1/4% Nickel).....	0.55
2300 (3 1/2% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70

4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/4 in. thick, regardless of sectional area, take the bar price.

### Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.00c.
Bars, f.o.b. Chicago.....	2.00c.
Bars, Cleveland.....	2.00c.
Bars, Buffalo.....	2.00c.
Shafting, ground, f.o.b. mill.....	*2.35c. to 3.30c.

\*According to size.

## SHEETS, STRIP, TIN PLATE, TERNE PLATE

### Sheets

#### Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh.....	1.55c. to 1.60c.
No. 10, f.o.b. Chicago mill.....	1.65c. to 1.70c.
No. 10, del'd Philadelphia.....	1.86c. to 1.96c.
No. 10, f.o.b. Birmingham.....	1.70c. to 1.80c.
No. 10, c.i.f. Pacific Coast ports.....	2.30c.

#### Hot-Rolled and Annealed

No. 10, Pittsburgh.....	1.70c. to 1.75c.
No. 10, Chicago mills.....	1.80c. to 1.85c.
No. 10, Birmingham.....	1.85c. to 1.90c.

#### Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh.....	2.20c.
No. 24, f.o.b. Chicago mills.....	2.30c.
No. 24, del'd Philadelphia.....	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham.....	2.35c. to 2.50c.
No. 24, c.i.f. Pacific Coast ports.....	2.80c.

#### Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh.....	2.25c.
No. 10 gage, f.o.b. Chicago mills.....	2.35c.
No. 10 gage, del'd Philadelphia.....	2.46c.

#### Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh.....	2.75c.
No. 20 gage, f.o.b. Chicago mills.....	2.85c.
No. 20 gage, del'd Philadelphia.....	3.06c.

#### Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	2.80c. to 2.90c.
--------------------------------	------------------

### Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh.....	2.50c. to 2.65c.
No. 20, f.o.b. Pittsburgh.....	2.95c. to 3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

### Galvanized Sheets

No. 24, f.o.b. Pittsburgh.....	2.85c.
No. 24, f.o.b. Chicago mills.....	2.95c.
No. 24, del'd Philadelphia.....	3.16c.
No. 24, f.o.b. Birmingham.....	3.00c.
No. 24, c.i.f. Pacific Coast ports.....	3.45c.

### Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh.....	2.90c. to 3.00c.
---	------------------

### Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh.....	2.60c.
No. 20, f.o.b. Pittsburgh.....	3.10c.

### Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.40c. to 2.50c.
No. 28, Chicago mill.....	2.50c. to 2.60c.

### Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills.....	\$4.75
Standard cokes, f.o.b. Gary.....	4.85

### Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$9.50	25-lb. coating I.C. \$14.10
15-lb. coating I.C. 12.00	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00	40-lb. coating I.C. 16.70

### Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh.....	1.50c. to 1.55c.
Wider than 6 in., P'gh.....	1.40c. to 1.45c.
6 in. and narrower, Chicago.....	1.60c. to 1.65c.
Wider than 6 in., Chicago.....	1.50c. to 1.55c.
Cooperage stock, P'gh.....	1.60c. to 1.70c.
Cooperage stock, Chicago.....	1.70c. to 1.80c.

### Cold-Rolled Strips

F.o.b. P'gh.....	1.90c. to 2.00c.
F.o.b. Cleveland.....	1.85c. to 2.00c.
Del'd Chicago.....	2.20c. to 2.30c.
F.o.b. Worcester.....	2.05c. to 2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	2.85c. to 3.00c.

## STEEL PIPE AND TUBING

plementary discounts of 5 and 2 1/2%; and on galvanized by 1 1/2 points with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

### Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/4 in. 38	1 1/2 in. 1
2 1/2 in.—2 3/4 in. 46	1 3/4 in. 8
3 in. 52	2 in.—2 1/4 in. 13
3 1/2 in.—3 3/4 in. 54	2 1/2 in.—2 3/4 in. 16
4 in. 57	3 in. 17
4 1/2 in. to 6 in. 46	3 1/2 in. to 3 3/4 in. 18
	4 in. 20
	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

### Standard Commercial Seamless Boiler Tubes

#### Cold Drawn

1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/4 to 3 1/2 in. 48
1 1/2 in. 57	4 in. 51
2 to 2 1/4 in. 37	4 1/2, 5 and 6 in. 40
2 1/2 to 2 3/4 in. 40	

#### Hot Rolled

2 and 2 1/4 in. 38	3 1/4 to 3 1/2 in. 54
2 1/2 and 2 3/4 in. 46	4 in. 57
3 in. 52	4 1/2, 5 and 6 in. 46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

### Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30% base (carloads)...	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/4.....	47	21 1/2	1/4 and 3/8.....	+9	+34
3/8.....	53	27 1/2	1/2.....	25	7
1/2.....	58	44 1/2	3/4.....	30	13
3/4.....	62	50 1/2	1 and 1 1/4.....	33	17
1 to 3.....	64	52 1/2	1 1/2 and 2.....	37	20
<b>Lap Weld</b>					
2.....	57	45 1/2	2.....	25	11
2 1/2 to 6.....	61	49 1/2	2 1/2 to 3 1/2.....	30	15
7 and 8.....	58	45 1/2	4 to 6.....	32	19
9 and 10.....	56	43 1/2	7 and 8.....	31	18
11 and 12.....	65	42 1/2	9 to 12.....	28	13
<b>Butt Weld, extra strong, plain ends</b>					
1/4.....	43	26 1/2	1/4 and 3/8.....	+11	+46
3/8 to 1.....	49	32 1/2	1/2.....	25	9
1 1/2.....	55	44 1/2	3/4.....	30	14
3/4.....	60	49 1/2	1 to 2.....	36	20
1 to 1 1/2.....	62	51 1/2			
2 to 3.....	63	52 1/2			
<b>Lap Weld, extra strong, plain ends</b>					
2.....	55	44 1/2	2.....	31	15
2 1/2 to 4.....	59	48 1/2	2 1/2 to 4.....	36	22
4 1/2 to 6.....	58	47 1/2	4 1/2 to 6.....	35	21
7 to 8.....	54	41 1/2	7 and 8.....	33	19
9 and 10.....	47	34 1/2	9 to 12.....	23	10
11 and 12.....	46	33 1/2			

On carloads the above discounts on steel pipe are increased on black by one point, with sup-



# Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)  
(After Dec. 31, extras of 10c. a 100 lb. on mixed  
and joint carloads, 25c. on pool carloads and 40c.  
on less than carloads will be applied on all mer-  
chant wire products.)

### To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

### To Jobbing Trade

Base per Keg	
Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95
Base per Lb.	
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.

Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.
Woven wire fence, No. 9 gage, per net ton	\$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00
Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.	

## RAILS AND TRACK SUPPLIES

### Rails

Per Gross Ton	
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

### Track Equipment

Base per 100 Lb.	
Spikes, ½-in. and larger	\$2.60
Spikes, ½-in. and larger	2.60
Spikes, boat and barge	2.80

Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	.73 per cent off list

## BOLTS, NUTS, RIVETS AND SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

#### Per Cent Off List

Machine bolts	75
Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex. nuts, blank or tapped	75
Washers*	7.00c. to 6.75c. per lb. off list

\*F.o.b. Chicago, New York and Pittsburgh.  
†Bolts with rolled thread up to and including ¼ in. x 6 in. take 10 per cent lower list prices.

### Bolts and Nuts

#### Per Cent Off List

Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh.	85 and 10
Stove bolts in packages, Ch'go.	85 and 10
Stove bolts in pkgs., Cleveland	85 and 10
Stove bolts in bulk, P'gh.	85, 10 and 2½
Stove bolts in bulk, Ch'go.	85, 10 and 2½
Stove bolts in bulk, Cleveland	85, 10 and 2½
Tire bolts	.60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

### Large Rivets

(½-in. and larger)

Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

### Small Rivets

(½-in. and smaller)

#### Per Cent Off List

F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

### Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

#### Per Cent Off List

Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	80, 10 and 5
Milled studs	70

## SEMI-FINISHED STEEL

### Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton	
Pittsburgh	\$26.00
Youngstown	26.00
Cleveland	26.00

### Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton	
Pittsburgh	\$26.00 to \$27.00
Youngstown	26.00 to 27.00
Cleveland	26.00

## COKE, COAL AND FUEL OIL

### Coke

#### Per Net Ton

Furnace, f.o.b. Connellsville prompt	\$2.25
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	8.27

Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

### Coal

#### Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ¾-in., f.o.b. Pa. mines	\$1.70 to \$1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.40 to 0.60
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

### Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	3.50c.
No. 4 industrial	3.00c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	3.50c.
No. 4 industrial	3.25c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	4.75c.
No. 4 distillate	4.00c.

## REFRACTORIES

Illinois	38.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

### Chrome Brick

#### Per Net Ton

Standard size	\$42.50
---------------	---------

### Silica Brick

#### Per 1000 f.o.b. Works

Pennsylvania	\$38.00
Chicago	47.00

## CAST IRON PIPE

6-in. and larger, del'd New York	\$28.20
4-in., del'd New York	31.20
6-in. and larger, Birmingham	\$32.00 to 33.00

4-in., Birmingham	\$35.00 to \$36.00
-------------------	--------------------

Class "A" and gas pipe, \$3 extra.

# Pig Iron Prices for All Districts

## ▶ VALLEY ◀

Per gross ton, f.o.b. Valley furnace:

Basic	\$14.50
Bessemer	15.50
Gray forge	15.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

## ▶ PITTSBURGH ◀

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$15.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

## ▶ CHICAGO ◀

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	\$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super. charcoal, sil.	
1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sil. 1 to 2, copper free	\$28.50 to 29.20
Silvery, sil. 8 per cent.	23.67
Bess. ferrosilicon, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

## ▶ ST. LOUIS ◀

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., del'd	\$14.56 to 15.56
Northern malleable, deliv'd	18.80
Northern basic, deliv'd	18.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

## ▶ NEW YORK ◀

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east.	
N. J.	\$17.91 to \$18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

\*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

## ▶ BUFFALO ◀

Per gross ton, f.o.b. furnace:

No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

## ▶ NEW ENGLAND ◀

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	19.74
*Ala., sil. 2.25 to 2.75	20.24
†Ala., sil. 1.75 to 2.25	15.88
†Ala., sil. 2.25 to 2.75	16.28

Freight rates: \$5.04 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

\*All rail rate.  
†Rail and water rate.

## ▶ PHILADELPHIA ◀

Per gross ton at Philadelphia:

East. Pa. No. 2	\$15.64 to \$16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.00
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

## ▶ CLEVELAND ◀

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	\$16.00
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	16.00
Ohio silvery, 8 per cent.	21.87
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

## ▶ BIRMINGHAM ◀

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

## ▶ CANADA ◀

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

# Prices of Ores, Ferroalloys and Fluorspar

## Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	.8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	.900c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	22c. to 23c.
Tungsten, Chinese wolframite	\$11.00 to \$11.25
Tungsten, domestic scheelite	9.50 to 10.00

Chrome, 45% Cr <sub>2</sub> O <sub>3</sub> crude, c.i.f. Atlantic seaboard	\$18.00
Chrome, 48% Cr <sub>2</sub> O <sub>3</sub> , c.i.f. Atlantic seaboard	20.00

## Ferromanganese

Domestic, 80%, seaboard	\$72.00 to \$75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

\*Minimum price quoted for lots of 2000 tons or more.

## Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$26.00 to \$27.00
---------------------	--------------------

## Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	\$77.50
50% (less carload)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b. Welland, Ont., in carloads)	31.00
14% to 16% (less carloads)	36.00

## Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%	\$20.50
11%	21.00
12%	21.50
13%	22.50
14%	\$23.50
15%	24.00
16%	25.00
17%	26.50

## Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%	\$18.00
7%	18.50
8%	18.75
9%	19.00
10%	19.50
11%	20.00
12%	\$20.50
13%	21.50
14%	22.50
15%	23.00
16%	24.00
17%	25.50

## Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	23.50c. to 25.00c.
Ferrocromium, 0.05% carbon	25.50c. to 27.00c.
Ferrovandium, del., per lb. contained Va.	\$3.05 to \$3.30
Ferrocobaltitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton higher

## Fluorspar

Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	\$20.31
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.31
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to 17.40
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	\$2.00



# Old Material Quotations

## ► PITTSBURGH ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel..	\$10.00 to \$10.50
No. 2 heavy melting steel..	9.00 to 9.50
No. 2 railroad wrought..	10.00 to 10.50
Scrap rails .....	10.00 to 10.50
Rails 3 ft. and under....	12.00 to 12.50
Sheet bar crops, ordinary..	11.00 to 11.50
Compressed sheet steel....	9.75 to 10.25
Hand bundled sheet steel..	8.50 to 9.00
Hvy. steel axle turnings....	9.00 to 9.50
Machine shop turnings....	7.00 to 7.50
Short shov. steel turnings..	6.75 to 7.25
Short mixed borings and turnings .....	6.75 to 7.25
Cast iron borings .....	6.75 to 7.25
Cast iron carwheels .....	10.00 to 10.50
Heavy breakable cast .....	8.00 to 8.50
No. 1 cast .....	9.50 to 10.00
Railr. knuckles and couplers .....	10.50 to 11.50
Rail. coll and leaf springs .....	10.50 to 11.50
Rolled steel wheels .....	10.50 to 11.50
Low phos. billet crops....	13.00 to 13.50
Low phos. sheet bar crops .....	12.50 to 13.00
Low phos. plate scrap....	11.00 to 11.50
Low phos. punchings....	10.50 to 11.50
Steel car axles .....	15.00 to 15.50

## ► CHICAGO ◀

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel.....	\$7.00 to \$7.25
Shoveling steel.....	7.00 to 7.25
Frogs, switches and guards .....	7.00 to 7.25
Hydraulic comp. sheets .....	5.75 to 6.25
Drop forge flashings.....	5.00 to 5.50
No. 1 bushelling .....	5.00 to 5.50
Rolled carwheels .....	7.50 to 8.00
Railroad tires .....	9.00 to 9.50
Railroad leaf springs....	8.50 to 9.00
Axle turnings .....	5.75 to 6.25
Steel couplers and knuckles .....	8.25 to 8.75
Coil springs .....	9.50 to 10.00
Axle turnings (elec. fur.) .....	6.00 to 6.50
Low phos. punchings....	9.50 to 10.00
Low phos. plates, 12 in. and under .....	9.00 to 9.50
Cast iron borings .....	4.50 to 5.00
Short shoveling turnings .....	4.50 to 5.00
Machine shop turnings....	4.00 to 4.50
Rerolling rails .....	10.25 to 10.75
Steel rails, less than 3 ft. .....	9.25 to 9.75
Steel rails, less than 2 ft. .....	10.00 to 10.50
Angle bars, steel .....	8.25 to 8.75
Cast iron carwheels .....	7.25 to 7.75
Railroad malleable .....	6.50 to 7.00
Agricultural malleable....	6.00 to 6.50
*Relaying rails, 56 to 60 lb. .....	19.00 to 21.00
*Relay. rails, 65 lb. and up .....	22.00 to 27.00

### Per Net Ton

Iron angle and splice bars..	\$7.00 to \$7.50
Iron arch bars, transoms..	7.00 to 7.50
Iron car axles .....	13.00 to 14.00
Steel car axles .....	10.00 to 10.50
No. 1 railroad wrought..	5.50 to 6.00
No. 2 railroad wrought..	6.25 to 6.50
No. 1 bushelling .....	4.75 to 5.25
No. 2 bushelling .....	2.50 to 3.00
Locomotive tires, smooth..	8.00 to 9.00
Pipes and flues .....	3.25 to 3.75
No. 1 machinery cast .....	7.50 to 8.00
Clean automobile cast .....	7.25 to 7.75
No. 1 railroad cast .....	6.00 to 6.50
No. 1 agricultural cast .....	6.25 to 6.75
Stove plate .....	5.75 to 6.25
Grate bars .....	5.50 to 6.00
Brake shoes .....	6.50 to 7.00

\*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

## ► PHILADELPHIA ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel..	\$7.00 to \$7.75
No. 2 heavy melting steel..	5.50 to 6.00
No. 1 railroad wrought..	8.50 to 9.00
Bundled sheets .....	6.00
Hydraulic compressed, new .....	6.50 to 7.00
Hydraulic compressed, old..	5.50 to 6.00
Machine shop turnings....	4.00 to 4.50
Heavy axle turnings.....	6.00 to 6.50
Cast borings (nom.) .....	3.50
Heavy breakable cast .....	9.00
Stove plate (steel works) .....	7.00
No. 1 low phos. hvy. ....	10.00 to 11.00
Couplers and knuckles....	8.50 to 9.00
Rolled steel wheels .....	8.50 to 9.00
No. 1 blast furnace .....	3.50
Spec. iron and steel pipe..	10.50
Shafting .....	13.50 to 14.00
Steel axles .....	14.50 to 15.00
No. 1 forge fire .....	6.00
Cast iron carwheels .....	10.00 to 10.50
No. 1 cast .....	10.00 to 10.50
Cast borings (chem.) .....	11.50 to 12.00
Steel rails for rolling....	10.50

## ► CLEVELAND ◀

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel..	\$7.25 to \$7.75
No. 2 heavy melting steel..	6.50 to 7.00
Compressed sheet steel....	7.00 to 7.25
Light bundled sheet stampings .....	6.00 to 6.50
Drop forge flashings.....	6.00 to 6.25
Machine-shop turnings....	4.25 to 4.50
Short shoveling turnings..	5.75 to 6.25
No. 1 bushelling .....	6.50 to 6.75
Steel axle turnings.....	7.50 to 8.00
Low phos. billet crops....	14.00 to 14.50
Cast iron borings .....	5.75 to 6.00
Mixed borings and short turnings .....	5.75 to 6.00
No. 2 bushelling .....	5.75 to 6.00
No. 1 cast .....	9.00 to 9.50
Railroad grate bars.....	6.00 to 6.50
Stove plate .....	6.00 to 6.50
Rails under 3 ft. ....	12.00 to 12.50
Rails for rolling .....	11.00 to 12.00
Railroad malleable .....	9.50 to 10.00

## ► BUFFALO ◀

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel..	\$8.00
No. 2 heavy melting scrap..	6.50
Scrap rails .....	\$8.00 to 8.50
New hydraulic comp. sheets .....	6.50
Old hydraulic comp. sheets .....	5.50
Drop forge flashings.....	6.50
No. 1 bushelling .....	6.50 to 7.00
Hvy. steel axle turnings....	7.00 to 7.50
Machine shop turnings....	5.00
Knuckles and couplers .....	10.00
Coil and leaf springs .....	10.00
Rolled steel wheels .....	10.00
Low phos. billet crops....	12.00 to 12.50
Short shov. steel turnings..	6.50 to 7.00
Short mixed borings and turnings .....	6.00 to 6.50
Cast iron borings .....	6.00 to 6.50
No. 2 bushelling .....	3.50 to 4.00
Steel car axles .....	10.00 to 11.00
Iron axles .....	12.00 to 12.50
No. 1 machinery cast .....	9.25 to 9.75
No. 1 cupola cast .....	8.75 to 9.00
Stove plate .....	8.25 to 8.75
Steel rails, 3 ft. and under .....	11.50 to 12.00
Cast iron carwheels .....	9.00 to 9.50
Industrial malleable.....	9.00 to 9.50
Railroad malleable .....	9.00 to 9.50
Chemical borings .....	8.50 to 9.00

## ► BIRMINGHAM ◀

Per gross ton delivered consumers' yards:

Heavy melting steel.....	\$7.50 to \$8.00
Scrap steel rails .....	8.00 to 8.50
Short shoveling turnings..	3.50 to 4.00
Stove plate .....	6.00
Steel axles .....	12.00
Iron axles .....	12.00
No. 1 railroad wrought..	6.00
Rails for rolling .....	9.00 to 9.50
No. 1 cast .....	9.00
Tramcar wheels .....	8.50
Cast iron borings, chem..	8.50

## ► ST. LOUIS ◀

Dealers' buying prices per gross ton:

Selected heavy steel.....	\$7.00 to \$7.50
No. 1 heavy melting .....	6.25 to 6.75
No. 2 heavy melting .....	5.75 to 6.25
No. 1 locomotive tires....	6.50 to 7.00
Misc. stand-sec. rails....	7.50 to 7.75
Railroad springs .....	8.50 to 9.00
Bundled sheets .....	4.25 to 4.75
No. 2 railroad wrought..	6.25 to 6.75
No. 1 bushelling .....	5.50 to 6.00
Cast iron borings and shoveling turnings....	4.75 to 5.25
Iron rails .....	7.00 to 8.00
Rails for rolling .....	9.00 to 9.50
Machine shop turnings....	3.00 to 3.50
Heavy turnings .....	5.00 to 5.50
Steel car axles .....	9.50 to 10.00
Iron car axles .....	13.25 to 13.75
Wrot. iron bars and trans. .....	5.00 to 5.50
No. 1 railroad wrought..	4.75 to 5.25
Steel rails, less than 3 ft. .....	9.50 to 10.00
Steel angle bars .....	6.50 to 7.00
Cast iron carwheels .....	6.00 to 6.50
No. 1 machinery cast .....	8.00 to 8.50
Railroad malleable .....	5.00 to 5.50
No. 1 railroad cast .....	6.25 to 6.75
Stove plate .....	6.00 to 6.50
Relay. rails, 60 lb. and under .....	16.00 to 16.50
Relay. rails, 70 lb. and over .....	20.00 to 21.00
Agricuilt. malleable .....	5.00 to 5.50

## ► NEW YORK ◀

Dealers' buying prices per gross ton:

No. 1 heavy melting steel..	\$4.25 to \$5.50
No. 2 heavy melting steel..	3.75 to 4.50
Heavy melting steel (yard) .....	2.75 to 3.00
No. 1 hvy. breakable cast..	5.00 to 5.50
Stove plate (steel works) .....	3.00 to 3.50
Machine shop turnings....	1.00 to 1.50
Short shoveling turnings..	1.00 to 1.50
Cast borings .....	1.00 to 1.50
No. 1 blast furnace .....	1.00 to 1.50
Steel car axles .....	10.00 to 10.50
Iron car axles (nom.) .....	14.00 to 14.50
Spec. iron and steel pipe..	5.00
Forge fire .....	3.25
No. 1 railroad wrought..	5.00 to 5.25
No. 1 yard wrought, long..	4.00 to 4.25
Rails for rolling .....	6.00 to 6.25
Stove plate (foundry) .....	4.75 to 5.25
Malleable cast (railroad) .....	6.00 to 6.50
Cast borings (chemical) ..	8.00 to 8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast .....	\$8.50
No. 1 hvy. cast (cupola size) .....	7.50
No. 2 cast .....	6.50

## ► BOSTON ◀

Dealers' buying prices per gross ton:

No. 1 heavy melting steel..	\$4.00 to \$4.25
Scrap T rails .....	3.80 to 4.60
Machine shop turnings....	1.05
Cast iron borings .....	1.05
Bundled skeleton, long....	2.50
Forge flashings .....	3.00 to 3.50
Blast furnace scrap .....	1.05
Forge scrap .....	3.00 to 3.25
Shafting .....	9.50 to 10.00
Steel car axles .....	9.00 to 9.50
Wrought pipe .....	4.00 to 4.25
Rails for rolling .....	6.00 to 6.50
Cast iron borings, chemical .....	7.00 to 7.25

Per gross ton delivered consumers' yards:

Textile cast .....	\$8.75 to \$9.25
No. 1 machinery cast .....	8.75 to 9.25
Stove plate .....	5.00 to 5.25
Railroad malleable .....	10.50 to 11.00

## ► CINCINNATI ◀

Dealers' buying prices per gross ton:

Heavy melting steel.....	\$6.00 to \$7.00
Scrap rails for melting....	8.00 to 8.50
Loose sheet clippings.....	2.50 to 3.00
Bundled sheets .....	4.75 to 5.25
Cast iron borings .....	2.75 to 3.25
Machine shop turnings....	3.25 to 3.75
No. 1 bushelling .....	4.25 to 4.75
No. 2 bushelling .....	2.50 to 3.00
Rails for rolling .....	9.00 to 9.50
No. 1 locomotive tires....	8.50 to 9.00
Short rails .....	11.75 to 12.25
Cast iron carwheels .....	8.25 to 8.75
No. 1 machinery cast .....	10.00 to 10.50
No. 1 railroad cast .....	8.75 to 9.25
Burnt cast .....	4.25 to 4.75
Stove plate .....	4.25 to 4.75
Agricultural malleable....	8.00 to 8.50
Railroad malleable .....	9.00 to 9.50

## ► DETROIT ◀

Dealers' buying prices per gross ton:

Hvy. melting .....	\$5.75 to \$6.25
Borings and short turnings .....	4.00 to 4.50
Long turnings .....	3.25 to 3.75
No. 1 machinery cast .....	8.50 to 9.00
Automotive cast .....	10.75 to 11.25
Hydraul. comp. sheets....	5.75 to 6.25
Stove plate .....	4.50 to 5.00
New No. 1 bushelling .....	4.75 to 5.25
Old No. 2 bushelling .....	3.00 to 3.50
Sheet clippings .....	3.25 to 3.75
Flashings .....	4.75 to 5.25

## ► CANADA ◀

Dealers' buying prices per gross ton:

Toronto Montreal	
Heavy melting steel.....	\$7.00 \$6.00
Rails, scrap .....	7.00 6.00
No. 1 wrought .....	6.00 8.00
Machine shop turnings....	2.00 2.00
Boiler plate .....	5.00 4.50
Heavy axle turnings.....	2.50 2.50
Cast borings .....	2.00 2.00
Steel borings .....	2.00 2.00
Wrought pipe .....	7.00 9.00
Steel axles .....	7.00 11.00
Axles, wrought iron .....	12.50 10.00
No. 1 machinery cast .....	10.00 8.00
Stove plate .....	11.00 8.50
Standard carwheels.....	10.00 8.00



# ▲▲▲ Warehouse Prices for Iron and Steel Products ▲▲▲

## ► CHICAGO ◀

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.75c.
Rail steel reinforcement.....	1.55c. to 1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{3}{8}$ in. (in Nos. 10 and 12 gages).....	2.95c.
Hoops (No. 14 gage and lighter)...	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes ( $\frac{3}{8}$ in. and lighter).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	3.75c.
Rivets, boiler.....	3.75c.
Per Cent Off List	
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap. or blank..	73
Hot-pressed nuts, hex., tap. or blank..	73
No. 8 black ann'l'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c't'd nails, base per keg.....	2.30

## ► CLEVELAND ◀

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinforc. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{3}{8}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip.....	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled sheets (No. 10).....	3.00c.
Black ann'l'd wire, per 100 lb.....	\$2.75
No. 9 galv. wire, per 100 lb.....	3.20
Com. wire nails, base per keg.....	2.35

\*Net base, including boxing and cutting to length.

## ► CINCINNATI ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinfrc. bars.....	3.00c.
Rail steel reinfrc. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares.....	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (10 to 49 kegs).....	2.65
Larger quantities.....	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.....	\$17.50
4-in.....	36.00
Lap-welded steel boiler tubes, 2-in..	16.50
4-in.....	34.50

## ► BUFFALO ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands.....	3.35c.
Hoops.....	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

## ► NEW YORK ◀

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*).....	4.00c.
Long terme sheets (No. 24).....	5.60c.
Standard tool steel.....	12.00c.
Wire, black annealed (No. 10).....	3.60c.
Wire, galv. annealed (No. 10).....	4.05c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger.....	3.40c.
Smooth finish, 1 to 2 $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Common wire nails, base, per keg..	\$2.60
Per Cent Off List	
Machine bolts, cut thread:	
$\frac{3}{4}$ x 6 in. and smaller.....	.65 to .65 and 10
1 x 30 in. and smaller.....	.65 to .65 and 10
Carriage bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller.....	.65 to .65 and 10
$\frac{3}{4}$ x 20 in. and smaller.....	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	

## ► ST. LOUIS ◀

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.40c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.00c.
Per Cent Off List	
Tank rivets, $\frac{7}{8}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

## ► PACIFIC COAST ◀

	Base per Lb.—		
	San Fran.	Los Angeles	Seattle
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier.....	2.80c.	3.15c.	2.50c.
Soft steel bars.....	2.80c.	3.15c.	2.50c.
Reinforcing bars.....	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24) ..	3.90c.	4.05c.	4.00c.
Hot-rolled sheets (No. 10).....	3.40c.	3.50c.	3.50c.
Galv. sheets (No. 24).....	4.40c.	4.35c.	4.50c.
Struc. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb.....	5.00c.	5.00c.	5.50c.
Cold-finished steel bars and shaftings:			
Rounds.....	5.25c.	5.00c.	4.25c.
Squares.....	6.25c.	6.00c.	5.50c.
Hexagons.....	6.25c.	6.00c.	5.50c.
Flats.....	6.75c.	6.00c.	6.00c.
Common wire nails, base per keg in less carloads.....	\$2.75	\$2.75	\$2.75
Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials.			
Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.			
All prices f.o.b. warehouse.			

## ► PITTSBURGH ◀

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes...	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.15c.
Galv. sheets (No. 24), 25 or more bundles.....	3.65c.
Hot-rolled sheets (No. 10).....	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	\$3.74
Spikes, large.....	2.50c.
Small.....	2.75c. to 2.90c.
Boat.....	3.00c.
Track bolts, all sizes, per 100 count, 70 and 10 per cent off list	
Machine bolts, 100 count, 70 and 10 per cent off list	
Carriage bolts, 100 count, 70 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'l'd, base per 100 lb.....	2.75
Wire, galv. soft, base per 100 lb.....	3.20
Common wire nails, per keg.....	2.35
Cement coated nails, per keg.....	2.35

\*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

## ► PHILADELPHIA ◀

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.45c.
Structural shapes.....	2.45c.
Soft steel bars, small shapes, iron bars (except bands).....	2.45c.
Reinforc. steel bars, sq., twisted and deform.....	2.30c.
Cold-fin. steel, rounds and hex.....	3.30c.
Cold-fin. steel, sq. and flats.....	3.80c.
Steel hoops.....	3.00c.
Steel bands, No. 12 to $\frac{3}{8}$ -in., inclu.	2.75c.
Spring steel.....	5.00c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled and annealed sheets (No. 10).....	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ in.....	5.00c.
Swedish iron bars.....	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

## ► BOSTON ◀

	Base per Lb.
Plates.....	*3.35c.
Structural shapes.....	*3.35c.
Soft steel bars, small shapes.....	*3.25c.
Reinforcing bars.....	3.10c. to 3.25c.
Iron bars—	
Refined.....	3.25c.
Best refined.....	4.60c.
Spring steel, open-hearth.....	5.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	*3.75c. to 4.25c.
Hoop steel.....	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts.....	70
Carriage bolts.....	70
Lag screws.....	70
Hot-pressed nuts.....	40 and 10
Cold-punched nuts.....	40 and 10
Stove bolts.....	70 and 10

\*Base price (250 to 999 lb.): less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

# Copper Prices Raised on Expectations of Satisfactory Restriction Agreement

NEW YORK, March 8.—Reflecting a marked improvement in sentiment both here and abroad, growing out of expectations of a satisfactory agreement among copper producers now in conference, the price of electrolytic copper for shipment through second quarter was advanced yesterday, now ranging from 6.25c. to 6.50c. a lb., delivered Connecticut Valley, while the price of export metal was raised on Saturday to 6.62½c. a lb., c.i.f. usual European ports. A fair volume of export business has been transacted at the new quotation. The total export sales so far this month amount to about 8000 tons. Although domestic consumers are manifesting slightly better interest in offerings, little business has yet crystallized. Lake copper is nominal at 6.25c. to 6.62½c., delivered.

Although the producers' conference has so far resulted in a virtual agreement to curtail production to 17½ per cent of total capacity, a number of details attending this feature of the discussion are yet to be settled. Another

problem on which a final concurrence has not been reached is that of regulations for marketing copper. A final agreement is expected to eventuate this week, however, and present indications point toward a satisfactory outcome of the conference.

## Copper Averages

The average price of Lake copper, based on daily quotations in THE IRON AGE, is 6.60c. a lb., delivered New York, for February. The average price of electrolytic copper is 6.07c., refinery, or 6.32c., delivered in the Connecticut Valley.

## Lead

Quiet buying in moderate volume continues. Speculative demand has disappeared, and consumers are interested only in covering for their actual needs. With consumers covered for about 60 per cent of March requirements and only 35 per cent of April needs, a fair amount of buying is expected during the remainder of March.

Prices are held firmly at 3.25c., New York, and 3.05c., St. Louis.

## Tin

A drop in the London price of tin today was balanced by a sharp advance in sterling. With future sterling commanding premiums of ½c. to ¾c. a month, tin buying is practically restricted to spot commitments. The domestic quotation is very firm, with today's price 22.10c. a lb. The London market today is £133 a ton for spot standard, £134 10s. for future standard and £136 for spot Straits. Today's Singapore market is £142 10s. Warehouse stocks in the United Kingdom increased 67 tons last week and now stand at 33,525 tons.

## Zinc

Demand is very quiet. Zinc for March-April shipment is generally quotable at 3.17c., New York, and 2.80c., East St. Louis, with May shipment commanding a slight premium.

## Antimony

In the absence of demand, prices are nominal. Metal for prompt shipment is quotable at 6.25c., f.o.b. New York, while futures are offered at 3.87½c., c.i.f. New York.

## The Week's Prices. Cost Per Pound for Early Delivery

	March 2	March 3	March 4	March 5	March 7	March 8
Lake copper, New York.....	6.12½	6.12½	6.12½	6.12½	6.50	6.50
Electrolytic copper, N. Y.*.....	5.50	5.50	5.75	5.75	6.25	6.25
Straits tin, spot, N. Y. ....	22.15	22.25	22.25	22.25	22.20	22.10
Zinc, East St. Louis.....	2.80	2.80	2.80	2.80	2.80	2.80
Zinc, New York.....	3.17	3.17	3.17	3.17	3.17	3.17
Lead, St. Louis.....	3.05	3.05	3.05	3.05	3.05	3.05
Lead, New York.....	3.25	3.25	3.25	3.25	3.25	3.25

\*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.  
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.  
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.  
Antimony, 6.25c. a lb., New York.  
Brass ingots, 85-5-5-5, 6.37½c. a lb., New York and Philadelphia.

## From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	24.00c. to 25.00c.
Tin, bar.....	26.00c. to 28.00c.
Copper, Lake.....	8.00c. to 9.00c.
Copper, electrolytic.....	7.75c. to 8.75c.
Copper, casting.....	7.50c. to 8.50c.
*Copper sheets, hot-rolled.....	15.37½c.
*High brass sheets.....	12.50c.
*Seamless brass tubes.....	15.75c.
*Seamless copper tubes.....	14.87½c.
*Brass rods.....	10.25c.
*Braided brass tubes.....	21.62½c.
Zinc, slab.....	4.25c. to 4.75c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.25c. to 4.75c.
Lead, bar.....	6.00c. to 7.00c.
Lead sheets.....	8.00c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelt-ing, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, ½ and ½.....	15.00c. to 16.00c.

\*These prices are also for delivery from Chicago and Cleveland warehouses.

## Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	26.25c.
Tin, bar.....	28.25c.

Copper, Lake.....	7.50c.
Copper, electrolytic.....	7.50c.
Copper, casting.....	7.25c.
Zinc, slab.....	4.25c. to 4.50c.
Lead, American pig.....	4.10c. to 4.40c.
Lead, bar.....	7.50c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	15.00c.
Babbitt metal, high grade.....	29.75c.
Solder, ½ and ½.....	17.50c.

## Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.50c.	5.25c.
Copper, hvy. and wire	4.25c.	5.00c.
Copper, light and bot-toms.....	3.50c.	4.12½c.
Brass, heavy.....	2.25c.	2.75c.
Brass, light.....	1.75c.	2.25c.
Hvy. machine com-position.....	3.50c.	4.00c.
No. 1 yel. brass turnings.....	2.50c.	3.00c.
No. 1 red brass or compos. turnings..	3.00c.	3.50c.
Lead, heavy.....	2.50c.	3.00c.
Zinc.....	1.00c.	1.375c.
Cast aluminum....	3.25c.	5.00c.
Sheet aluminum....	8.50c.	10.50c.

## American Rolling Mill Loss \$3,098,445 in 1931

The American Rolling Mill Co. reports a loss of \$3,098,445 for 1931. In 1930 it had a net income of \$114,094, equal to 3c. a share on the common stock. The company's operations averaged 37.2 per cent of capacity during 1931.

In its pamphlet report for 1931 Bethlehem Steel Corp. states that its 1931 production consisted of 2,202,427 tons of pig iron and ferromanganese, 3,319,994 tons of open-hearth, Bessemer and electric steel ingots and 2,503,111 tons of rolled steel and other finished products.

The Jones & Laughlin Steel Corp., Pittsburgh, reports that its pig iron production in 1931 amounted to 1,044,741 gross tons, compared with 1,882,295 tons in 1930 and 2,601,318 tons in the preceding year. Steel ingot output declined to 1,363,300 tons from 2,166,489 tons in 1930 and 2,977,999 tons in 1929. Total shipments of steel products amounted to 1,115,894 net tons in 1931, compared with 1,757,894 tons in the preceding year and 2,455,435 tons in 1929.



# What Must We Do to the Machine?

(Concluded from page 599)

then placed bets on her, through the agency of the stock market, that she would double her speed every six months. We expected the impossible to happen, and we got it—but it was not what we expected!

We erected a huge roulette wheel on the back of the machine so that we could gamble with and for the wealth increments that its honest work produced. We labeled this "the stock market" and professed its purpose to be the legitimate financing of mechanization and business. We transformed this into the most stupendous gambling hell that the world has ever seen, and one in which the fruits of the machine are dissipated in speculation instead of being distributed in sound consumption-developing channels. For you and I know, regardless of the protestations now being made, that the greater part of the daily stock transactions, even on "the big board," are bets and not investments. If you do not know it, you will when I point out the fact that there are not more than 1,319,000,000 shares of common and preferred comprising the total capitalization of all of the companies listed on the New York Stock Exchange; yet in normal times, two and a half million share days would be considered small business. Which means that in one year's sales of stock, on the basis of 300 days, the transactions amount to 57 per cent, numerically, of the sum total of all issues both active and inactive.

The owners of the machine were not responsible for this gambling fever, although they caught the contagion when everyone else did and they overcapitalized their businesses after the public had bid them up.

The owners of the machine are not alone responsible for the stupendous increase in the cost of government which is now causing a frenzied scramble, in Washington, to discover new ways to additionally burden the machine through increased taxes.

The owners of the machine are not alone responsible for the increase of graft and the decrease in revenue which have followed in the wake of the noble experiment and which have diverted a large portion of income into the pockets of pirates and privateers and away from the pocket-books of the average consumer.

Changes in occupational distribution, while not coming into the category of the previously mentioned items of non-productive burdens, are

in themselves an indication of our ominous growth of overhead.

Agriculture, mining, manufacturing and construction, for example, are our basic wealth producers. Transportation, trade, public, professional and domestic service are necessary adjuncts of production and of living. They facilitate wealth production, but in themselves they create no new values. They are really called our overhead. Here is the way our occupational overhead has been going up. In 1910, the number of workers comprising the overhead occupations was 57 per cent of the number in the productive groups. In 1920 it was 68 per cent, in 1930 it was 87 per cent. A pretty rapid increase in 20 years' time in the number of passengers riding upon the machine.

The adjustment of the machine to mankind must be a gradual one. No one man is big enough to prepare or suggest a practical immediate remedy. But there are signs that this remedy is nevertheless being prepared. Public opinion is being turned over as never before in the mortar of depression with the hard pestle of adversity. Like a serious contagious disease, this depression is forming its own anti-bodies which will help to immunize us in the future. Not a complete immunization, perhaps, but at least a building up of resistance to the ravages of speculative fever and the sub-normal swings of unemployment.

What are the signs? First and perhaps most important, there is a

general recognition on the part of capital and management which has become evident during the depression that, while the world may not owe any man a living, a civilized world owes every man willing to work an opportunity to work. And that, while the civilized world cannot, through maladjustment, offer this working opportunity under the normal laws of supply and demand, we must temporarily suspend these laws to make work for those unable to find it.

Second, there is a growing acceptance on the part of capital and management of the belief that their material welfare and profits are directly related to the welfare and income of the average man—that it is a more intelligently selfish policy, let us say, to increase purchasing power by distributing a larger portion of the fruits of mechanical improvement in the form of wages and dividends and using a smaller portion for those capital investments which may lead to over-expansion and over-capacity.

Third, I think there is an evidence of growing interest throughout this country in the elimination of speculation, graft, and in the curtailment of government costs, a growing interest in the principles of economics, a growing tendency of business and industry to cooperate constructively rather than destructively.

These distinct and noticeable tendencies, largely the outcome of our recent experiences, are, I believe, sufficient in themselves, given time to spread, to set us back firmly again upon the solid ground where mechanization can continue with benefit to all.

## Steel Pontoons to Support Dredge Pipe in Mississippi

THESE eight steel pontoons for use by the United States Engineering Department at Memphis, Tenn., were recently completed by the International Stacey Corp., Cincinnati. The pontoons, specially designed, are for supporting suction dredge pipe used in dredging the Mississippi River. Each is 28 ft. in diameter at the water line, 5 ft. 6 in. deep, and weighs 23,000 lb. A recessed trough across the decks accommodates 36-in. dredge pipe. This is the first marine work by the Stacey company, which has long been identified with the fabrication of gas holders and similar tank work.





# Fabricated Structural Steel

Awards of 8450 Tons and New Projects of 9900 Tons  
in Smaller Volume

**L**ETTINGS of fabricated structural steel at 8450 tons, compare with 19,200 tons a week ago, which was the largest tonnage this year. Most of the activity was for miscellaneous work in the East, the largest job taking 930 tons. In the South, the University of Texas, at Austin, will use 1600 tons for an auditorium, library and other buildings. A bridge in Seattle will require 1800 tons. New projects of 9900 tons were also considerably below those in the previous week. The largest inquiries include 2700 tons for the Reading Railroad in connection with suburban electrification work, and 2000 tons for a bridge over the Canadian River at Bridgeport, Okla. Awards follow:

## NORTH ATLANTIC STATES

Needham, Mass., 105 tons, bridge over New York, New Haven & Hartford Railroad, to American Bridge Co.

Boston, 280 tons, approach and underpinning columns for East Boston tunnel, to American Bridge Co.

Albany, N. Y., 100 tons, track shed, to Ingalls Iron Works.

New Rochelle, N. Y., 100 tons, Wykagyl Club, to Grand Iron Works.

Brooklyn, 130 tons, extension to Beverly and Cortelyou Road station, to Ingalls Iron Works.

Meadville, Pa., 390 tons, State highway bridge, to Fort Pitt Bridge Works Co.

Philadelphia, 930 tons, FitzGerald Hospital, to American Bridge Co.

Baltimore, 735 tons, Northway apartment building, to Dietrich Brothers.

Cumberland, Md., 250 tons, post office to Mc-Clintic-Marshall Corp.

## SOUTH AND SOUTHWEST

Corpus Christi, Tex., 450 tons, cribs for harbor, to Peter Larsen Steel Co.

State of Florida, 120 tons, State bridge, to Virginia Bridge & Iron Co.

Austin, Tex., 1600 tons for University of Texas; 1315 tons for library and other buildings, to Virginia Bridge & Iron Co., 285 tons for an auditorium, to Austin Brothers.

Carlsbad, N. M., 400 tons, seven buildings for potash plant, to Virginia Bridge & Iron Co.

## CENTRAL STATES

Minneapolis, 260 tons, addition to power house for Minneapolis Street and Railway Power Co., to Minneapolis-Moline Power Implement Co.

Columbus, Ohio, 600 tons, grandstand for ball park, to Mount Vernon Bridge Co.; previously reported to International-Stacy Corp.

## WESTERN STATES

Fresno, Cal., 155 tons, Belmont Avenue subway, to Judson-Pacific Co.

Vancouver, Wash., 225 tons, equipment depot for United States Bureau of Public Roads, to Poole & McGonigle.

Seattle, 1800 tons, University Avenue bridge, to Wallace Bridge & Structural Steel Co.

Sunnyvale, Cal., 100 tons, helium and boiler plant at Navy dirigible base, to Judson-Pacific Co.

Los Angeles, 100 tons, Willard Storage Battery Co., to Pacific Iron & Steel Co.

## CANAL ZONE

Panama, 100 tons for Madden Dam, to Virginia Bridge & Iron Co.

## NEW STRUCTURAL STEEL PROJECTS

### NORTH ATLANTIC STATES

Albany, N. Y., 400 tons, grain elevator; James Stuart Corp., general contractor.

Philadelphia, 2700 tons, catenary construction for suburban electrification of Reading Railroad.

Philadelphia, 600 tons, Episcopal hospital, previously reported as 250 tons; bids in.

Washington, 4500 tons, addition to post office; reported last week as 8000 tons.

## THE SOUTHWEST

State of Oklahoma, 400 tons, highway bridge.

Bridgeport, Okla., 2000 tons, bridge across Canadian River.

Galveston, Tex., 440 tons, pipe line drag and haul house for United States Engineers; Ingalls Iron Works low bidder.

## CENTRAL STATES

De Pere, Wis., 1600 tons, State highway bridge over Fox River; bids confined to Wisconsin fabricators (Previously reported as 1000 tons).

State of Illinois, 700 tons, highway bridges.

State of Indiana, 500 tons, highway bridges.

Duluth, Minn., 900 tons, Medical Arts Building.

Jefferson City, Mo., 300 tons, post office.

## WESTERN STATES

Santa Monica, Cal., 388 tons, sheet steel piling for groynes, State highway, bids close March 23.

Los Angeles, 500-1000 tons, sheet steel piling for municipal water project, bids close March 15.

Salinas, Cal., 100 tons, State armory.

Sacramento, Cal., 1100 tons, post office; N. P. Severin Co. low bidder on general contract.

## FABRICATED PLATES

### AWARDS

Houston, Tex., 120 tons, tank plates for Shell Petroleum Corp., to Wyatt Metal Tank Co.

Los Angeles, 350 tons, Bouquet Canyon inverted siphon, to Consolidated Steel Co.

### NEW PROJECTS

Galveston, Tex., 500 tons, dredge for United States Engineers; Ingalls Iron Works Co. low bidder.

Los Angeles, 500-600 tons, tank for city; bids closed March 7.

## Cast Iron Pipe

Newton, Mass., awarded 500 tons of 6 and 12-in. to Warren Foundry & Pipe Corp.

Waterford, Conn., is inquiring for about 300 tons of 6 and 8-in.

Hawthorne, N. Y., opened bids on about 1500 tons of 6-in. and larger sizes; United States Pipe & Foundry Co. is low bidder.

North Creek, N. Y., placed 525 tons of 6, 8 and 10-in. with R. D. Wood & Co.

Mount Vernon, N. Y., will open bids March 10 on 400 tons of 12-in.

Newark, N. J., awarded 700 tons of 4 to 24-in. to Warren Foundry & Pipe Corp.

Fort Wayne, Ind., awarded 1000 tons of 8 to 24-in. to James B. Clow & Sons.

Minneapolis, Minn., placed 30,000 ft. of 6 to 16-in. with American Cast Iron Pipe Co.

Dallas, Tex., awarded about 700 tons to National Cast Iron Pipe Co. and 500 tons to McWane Cast Iron Pipe Co.

Signal Hill, Cal., placed 800 tons with American Cast Iron Pipe Co.

Beverly Hills, Cal., opened bids on 241 tons for city water system; Garrett Plumbing Co., Los Angeles, is low bidder.

Santa Barbara, Cal., opened bids on 100 tons of 4 to 12-in.; American Cast Iron Pipe Co. is low bidder.

Oakland, Cal., will open bids March 11 on 887 tons of 8, 10 and 16-in.

Glendale, Cal., will open bids March 17 on 600 tons of 6 and 8-in.

## Reinforcing Steel

Awards 920 Tons—New Projects  
930 Tons

### AWARDS

Brooklyn, 380 tons, State Hospital buildings, to Concrete Steel Co.

Cumberland, Md., 170 tons, post office, to Mc-Clintic-Marshall Corp.

Los Angeles, 103 tons, pier sheds 144-146, to Soule Steel Co.

Wenatchee, Wash., 115 tons, bridge piers, to Pacific Coast Steel Co.

Seattle, 150 tons, Juniata bridge, to Northwest Steel Rolling Mills.

### NEW REINFORCING BAR PROJECTS

Washington, 400 tons, addition to post office; bids to be opened March 29.

St. Paul, Minn., 250 tons, foundations for post office.

Orange County, Cal., 112 tons, Newport Beach highway structures; bids close March 23.

Seattle, 162 tons, East Marginal Way viaduct; bids close March 11.

## Pipe Lines

Northern Natural Gas System, City National Bank Building, Omaha, Neb., has work under way on 16-mile 18-in. pipe line from Plattsmouth, Neb. to Omaha. Fredell Construction Co., Denver, is contractor. Company plans to build number of 10, 8 and 6-in. distributing lines in city limits.

Oswego, Kan., plans call for bids for installation of pipe lines for natural gas distribution, totaling about 64,000 lin. ft., with gate valves, boxes, fittings, etc. Cost about \$30,000. Emporia Engineering Co., Emporia, Kan., is engineer.

San Antonio Public Service Co., San Antonio, Tex., plans extensions in natural gas lines in connection with expansion and improvement program. It is proposed to use 12-in. mains. Cost over \$200,000.

Baltimore awarded 125 tons for Montebello conduit to Acme Engineering Co., Baltimore.

Irak Petroleum Co., operating in Persia, is considering purchase of 125,000 tons of steel pipe.

Pacific Gas & Electric Co. will require about 8000 tons additional 26-in. pipe for 42-mile natural gas line from Milpitas to San Francisco.

San Diego, Cal., is in the market for 2800 tons of 36 and 48-in. pipe for a line from El Capitan Dam to Lakeside.

Los Angeles closed bids March 9 on 330 tons of 45-in. pipe.

## Railroad Equipment

Interborough Rapid Transit is inquiring for 50 to 100 subway passenger cars.

Pacific Fruit Express has ordered 100 refrigerator cars to be built in its own shops.

Canadian Pacific has ordered from International Equipment Co. two gas-electric rail motor cars to be built by Ottawa Car Co. and equipped with power units supplied by Electro-Motor Co.

Fruit Growers' Express has ordered 25 underframes from Pressed Steel Car Co.

# PLANT EXPANSION AND EQUIPMENT BUYING

## Used Machine Tools In Large Supply

Sales of New Equipment Show No General  
Broadening, But Repair Parts Are  
More Active

**A**LTHOUGH there is no general broadening in sales of new machine tools, the demand for good used tools has shown improvement, and the sales of such equipment, usually at "bargain" prices, are said to be larger in proportion to new equipment than dealers consider as normal in dull times.

Leading dealers in used tools have large stocks of both standard and spe-

cial tools, many of which have been purchased at liquidation sales, and consequently they are able to offer them at prices which have appealed to many manufacturing companies. At an auction sale of about 400 tools from the Cleveland plants of the Hupp Motor Corp. last week the interest was largely in standard tools. Most of the purchases were by dealers.

There are many outstanding quota-

tions on new machine tools, but companies considering such purchases are very slow to take action. However, many small shops are buying repair parts and accessories, a good sign, as they are quicker to respond to improvement in business than are the large plants.

Hastings, N. Y., has taken bids on 14 metal-working and wood-working tools for its schools.

### New York

The most noticeable change in the machine tool situation in this district is a larger number of inquiries for repair parts and accessories, particularly from small shops, which are quicker to respond to any improvement in business than the large plants. While there is no general broadening in demands for machine tools, some dealers are doing a little more business than in January or February. Hastings, N. Y., has taken bids on 14 metal-working and wood-working machines for use in its schools.

### Pittsburgh

Sentiment among local machine tool dealers and buyers is distinctly better. No large inquiry has appeared, but the volume of small individual requests for quotations is increasing. Dealers also have quotations out on a fair amount of large projects, but action has been delayed for several months on some of this business.

Individual buyers in the district are generally inactive and no sizable lists are in prospect. However, the Pennsylvania Railroad is soon expected to make known its plans for rebuilding its Twelfth Street shops at Altoona, recently destroyed by fire. Otherwise railroad inquiry is almost entirely lacking. Structural steel fabricators have bought few tools in the last six months and most of them have little work which will require new tooling.

### Cleveland

The machine tool market continues inactive with orders confined to single items. Users are buying only such tools as they actually need. There is little new business in prospect, al-

though inquiries have come out for two fair sized tools.

The auction sale of equipment in the Cleveland plants of the Hupp Motor Corp. last week, at which 400 machine tools were offered, drew a slim attendance and brought out low prices. Interest was confined largely to standard tools, most of which went at low prices. Special tools were hard to move. Most purchases were by dealers. Considerable machinery was not sold and attempts will be made to dispose of this at private sale.

### Chicago

Sales of machine tools remain few, but some encouragement can be taken from the fact that railroad mechanical departments are again showing interest and buyers are less reticent about discussing modern equipment. Small tool sales are holding up and many of these departments are self-sustaining. Used machine tool sales are larger in proportion to new equipment than dealers consider normal in dull times.

### Milwaukee

The month so far has shown little gain over the January-February average in machine tool sales, but the outlook is regarded as favorable to an increase in volume if pending inquiry is a good sign. Automotive industries continue to be the best source of inquiry and account for the major share of new business. Employment in foundries and machine shops has improved slightly, but production schedules, generally speaking, are still dragging.

### Cincinnati

The machine tool market is without trend. Fresh bookings were on a par

with the preceding week and represent urgent tool requirements. Interest in planning new equipment appears to have slackened, manufacturers reporting that inquiry has declined sharply.

## ◀ NEW YORK ▶

**Anchor Cap & Closure Corp.**, 22 Queens Street, Long Island City, manufacturer of bottle caps, sealing equipment, etc., purchased 22,000 sq. ft. from Dutchkills to Purvis Street for future addition.

**General Electric Co.**, Schenectady, N. Y., has acquired tract near Washington and Twelfth Avenues, South, Minneapolis, Minn., as site for new factory branch, storage and distributing plant. Cost over \$200,000 with equipment.

**Catskill Foundry & Machine Works**, Catskill, N. Y., has arranged for change of name to Parker Freezer & Machine Corp., at same time increasing capital from \$50,000 to \$300,000 for expansion.

**Van Blerck Marine Motors, Inc.**, New York, has been organized by Joseph C. W. Van Blerck, 610 Salem Avenue, Elizabeth, N. J., and George V. Christie, Hudson, N. Y., to manufacture marine engines and parts.

**Centaur Paper Mills Supply Corp.**, 425 Greenpoint Avenue, Brooklyn, lease building at 1160 Flushing Avenue, for new storage and distributing plant.

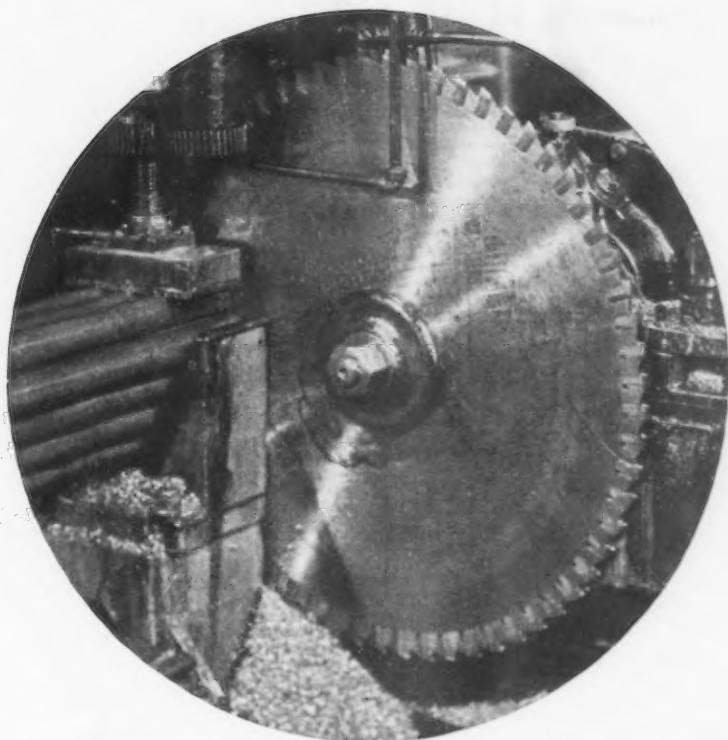
**Atlantic, Gulf & West Indies Steamship Lines**, Pier 13, East River, let contract to Babor-Comeau & Co., Inc., Grand Central Terminal, for new buildings on Pier 34, North River, 1024 x 165 ft., now being constructed. Units will be 50 x 700 ft., and will include main shed for cargo handling and distribution. Cost over \$400,000 with loading, conveying and other mechanical equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, and Naval Supply Depot, Brooklyn, asks bids until March 15 for one motor-driven roller die type nibbling machine (Schedule 7578), until March 22 for 77,000 lb. bar rivet steel (Schedule 7625) for Brooklyn Navy Yard.

**Beanor Service Station**, Rockaway Boulevard and 130th Street, Ozone Park, N. Y., has plans for one-story shop, 38 x 84 ft., for brake-testing and other service.

**Sarvas Electric Co.**, 48 West Twenty-first Street, New York, leased floor in building at Fortieth Avenue and Twenty-third Street, Long Island City, for local works.

**Benjamin E. Jarvis, Inc.**, Newark, N. J., manufacturer of special machinery, metal pat-



## HERE IS HOW YOU CAN CUT METAL FASTER

This Simonds Red Streak Inserted Tooth Metal Saw is a new type saw, developed by Simonds engineers with over 17 years leadership in the metal cutting field. Its teeth of high speed steel are located in the plate at the proper cutting angle and the curved gullets operate so efficiently that more than 50 per cent of the usual metal sawing difficulties are eliminated. It permits higher speed and feed.

We make this saw in five sizes—for cutting the largest heavy-duty work to the smallest, lighter material where economy of metal is particularly desired.

We shall be glad to co-operate with you in your metal cutting problems. Write us now.

### SIMONDS SAW AND STEEL CO.

"The Saw Makers"

Established 1832

FITCHBURG, MASS.

# SIMONDS

## INSERTED TOOTH

# METAL SAWS

## HAVE YOU HEARD?

Don't judge a man by the outside of his clothes. You ought to look at the lining and seams and the button-holes. This applies to Hack Saws. Study them a little. If you see the Red End on a blade, that's your tip. The quality is there.

♦ ♦ ♦

Moses appears to have withstood the "bull rushes" in the Senate. He's from the Granite State and a tough fella to tip over. This proves what we have said before, that action counts in metal cutting as well as in politics. You'll get lots of action and long service from a Simonds Inserted Tooth Metal Saw.

♦ ♦ ♦

March "comes in like a lion and goes out like a lamb." Usually by July 1st in these parts. Lasting weather. Which reminds us that High Speed Steel Hack Saws—the "Red Streak" kind—outlast and outcut substitutes from 10 to 20 times.

♦ ♦ ♦

Will Rogers of Oklahoma says,— "All I know is what I read in the papers." Next time you have a chance, Will, look over "Iron Age." Lad—there's a paper for you—good readin' and hints on how to use Simonds Metal Saws, Hack Saws and Files.

♦ ♦ ♦

Woman "Down East" thinks a Simonds "Red Streak" Metal Saw is musical because when she was a girl a stage troupe visited her town once and they played tunes on some circular saws that caused her to weep. Have courage—some saws have been known to make strong men shed tears of grief.

♦ ♦ ♦

Out in Dakota this month they're going to fire the first gun in the presidential primaries. We bet it's going to be a "boom" for someone. Hope it proves out as successful as that "Red End" Hack Saw Blade. Machinists vote for it.

♦ ♦ ♦

On form, at least, the "gay 90s" had it on us. In those days a lady in a drug store would flop the dry-goods a second and you'd hear the elastic go "pop" as the currency went down in the Domestic Department of the Old Lisle Thread Bank. nowadays some of the same people hire a safety deposit box and then commence to "holler" because money is out of circulation.

♦ ♦ ♦

Frequently manufacturers write us to say how much satisfaction they get in using the new Simonds Metal Cutting Band Saw Blade. In the automobile and aircraft plants these saws are working out exceptionally well.



terns, etc., has taken over building at 74-80 Malvern Street, for new plant, removing from 113 Mechanic Street and increasing capacity. **Hoyt Brothers, Inc.**, 100 Shipman Street, Newark, manufacturer of industrial chemicals, etc., asks bids on general contract for seven-story and basement plant, 57 x 80 ft. Cost over \$100,000 with equipment. **H. C. Hammel, Inc.**, 130 Branford Place, architect and engineer.

**Wishbow Brothers, Inc.**, Jersey City, N. J., has been organized by Alexander and Edward A. Wishbow to take over and expand company of same name at 2895 Hudson Boulevard, manufacturer of automobile parts and operating automobile repair works.

**Lakewood Comet Aero Advertising Co.**, Lakewood, N. J., recently organized by Captain Anton Heinan, 11 Seward Avenue, Toms River, N. J., and associates, plans local airport with hangar and other field units, including plant for manufacture of airplanes for advertising purposes. Cost over \$150,000 with equipment.

## ◀ PHILADELPHIA ▶

**Quartermaster Depot**, Twenty-first and John-sten Streets, Philadelphia, asks bids until March 23 for one pedestal type grinder, one motor buffer, one power saw, one speed lathe, one sensitive drill, one screw-cutting lathe, all motor-driven (Circular 167).

**Smith Twin Tubular Boiler Co.**, 1111 Frank-ford Avenue, Philadelphia, let contract to C. E. Woolston, 1510 North Twenty-eighth Street, for one-story mechanical shop.

**Challenge Auto Signal Co.**, Philadelphia, has been organized by Francis T. Owens, 5410 North Third Street and Conrad Weiler, 546 East Westmoreland Street, to manufacture automobile signal devices and equipment.

**Naval Aircraft Factory**, Navy Yard, Phila-delphia, asks bids until March 14 for 200 special thickness gages (Aero Req. 1225).

**Cunco Press, Inc.**, West Twenty-second and South Canal Streets, Chicago, has acquired plant of Fischman & Sons, Erie Avenue, Phila-delphia, 200,000 sq. ft., for new Eastern branch printing plant. All machinery will be motor-driven. Fischman organization recently completed arrangements to operate in other local buildings.

**Depot Quartermaster**, Marine Corps, Phila-delphia, asks bids until March 15 for 25 high tension magnetos (Req. 1631); until March 28 for 500,000 sq. ft. copper wire cloth (Schedule 633).

**Paterson Parchment Paper Co.**, 33 Eighth Street, Passaic, N. J., has plans for two-story addition, 90 x 200 ft., at Edgely, near Bristol. Pa. Cost over \$80,000 with equipment. **Haenichen Engineering Co.**, 222 West Broad-way, Paterson, N. J., engineer.

**Department of Properties and Supplies**, Capitol Building, Harrisburg, Pa., asks bids until March 16 for extensions and improvements in power plant at State sanatorium, Mont Alto. Pa. **John L. Hanna**, secretary.

**Bureau of Supplies and Accounts**, Navy De-partment, Washington, and Navy Yard, Phila-delphia, asks bids until March 15 for one motor-driven turret lathe (Schedule 7590); until March 22 for one motor-driven roll flattener machine (Schedule 7642); 150 i-r-flatable life rafts (Schedule 7607); 25 pres-sure gages (Schedule 7624) for Philadelphia Navy Yard.

**York Ice Machinery Corp.**, York, Pa., has secured contract for air-conditioning equip-ment for 78 passenger coaches for Baltimore & Ohio Railroad Co., Baltimore.

**S. Bolder & Co.**, Philadelphia, has been or-ganized by Samuel Bolder and Wade Stevenson to take over and expand company of same name at 826 Arch Street, operating repair and rebuilding works for textile machinery, sewing machines, cloth-cutting machinery, parts, etc.

**Pure Ice Co.**, Mill Street, Nanticoke, Pa., has taken over local building and will re-model for artificial ice-manufacturing plant. Cost over \$85,000 with machinery.

## ◀ SOUTH ATLANTIC ▶

**Purchasing and Contracting Officer**, Holo-bird Quartermaster Depot, Baltimore, asks bids until March 14 for parts for motor trucks (Circular 98.)

**Virginia Electric & Power Co.**, Richmond, Va., has disposed of bond issue of \$4,000,000, part of fund for general operations, expan-sion and improvements. Company recently authorized fund of \$1,629,000 for new con-struction, extensions and betterments this year.

**Norfolk & Western Railway Co.**, Roanoke, Va., Clyde Cocks, purchasing agent, asks bids until March 16 for year requirements for renewal parts for electrical equipment, also repairs to electrical apparatus, repair parts for mechanical stokers, etc. (Contract Serial AA-619.)

**Board of District Commissioners**, District

Building, Washington, asks bids until March 22 for one combination punch, shear and coping machine for city refuse department, until March 18 for quantity of signal cable.

**Ditchley Fertilizer Co.**, Kilmarnock, Va., plans rebuilding commercial fertilizer manu-facturing plant recently destroyed by fire. Loss over \$100,000 with equipment.

**Rogers, Strother & Hartman**, Waxhaw, N. C., G. H. Strother, head, are beginning development of gold-mining project in Union County, S. C., and contemplate erection of stamp mill and auxiliary operating units.

**Bureau of Ordnance**, Navy Department, Washington, asks bids until March 15 for gun barrel forgings (Adv. 133.)

**Baltimore & Ohio Railroad Co.**, Baltimore, is increasing working force at Mount Clare repair shops and about 200 men have been reinstated, making total of 1000 operatives.

**Roanoke Rapids Sanitary District**, Roanoke Rapids, N. C., H. D. Camp, secretary, asks bids until March 14 for elevated tank of 500,000 gal. capacity, pumping machinery, meters, chlorinator, etc., for sewage and waterworks. **Spoon & Lewis**, Greensboro, N. C., are engineers.

**Bureau of Supplies and Accounts**, Navy De-partment, Washington, asks bids until March 15 for 22,200 ft. steel wire rope for Hampton Roads and Mare Island Navy Yards (Schedule 7576); for centrifugal type ventilation fan equipments and spare parts for Brooklyn, Philadelphia, Mare Island and Puget Sound yards (Schedule 7606); until March 22 for 16 governors and spare parts for Boston and Puget Sound yards (Schedule 7614); for 199,680 ft. steel wire rope for Yorktown Navy Yard (Schedule 7629); 35,000 lb. carbon electrodes for Norfolk Navy Yard (Schedule 7623); one weighing scale for Hampton Roads Navy Yard (Schedule 7601).

**Dixie Spindle & Flyer Co.**, Charlotte, N. C., manufacturer of spindles and other textile mill machinery, is completing one-story plant at North Brevard and Twenty-second Street, 7000 sq. ft. space. Cost about \$40,000 with equipment.

**City Council**, Lynchburg, Va., plans installa-tion of steel tank on Pine Drive for balancing service, municipal water system. Cost about \$25,000.

## ◀ PITTSBURGH ▶

**United States Engineer Office**, Pittsburgh, will soon take bids for Montgomery twin locks,

## Machinery Exports and Imports Declined Again in January, Farm Equipment Drops Sharply

WASHINGTON, March 8.—Exports of machinery from the United States fell to the low mark of \$11,403,000 in January. This was a drop of \$6283 from the December total and of \$26,161 from that of January, 1931.

Outgoing shipments of agricultural machinery and imple-ments made a precipitate fall to only \$892,000 from \$8,661,000 in December, or a decline of virtually \$8,000,000. Exports of industrial machinery were \$5,090,348.

Imports declined to \$616,131 in January from \$890,138 in December and \$1,249,320 in January of last year.

### Imports of Machinery into the United States

(By Value)

	January, 1932	December, 1931	January, 1931
Metal - working machine tools .....	\$15,867	\$14,961	\$14,390
Agricultural machinery and implements .....	74,299	119,496	490,119
Electrical machinery and apparatus .....	115,645	291,104	170,338
Other power-generating machinery .....	21,277	11,092	14,945
Other machinery .....	314,494	373,602	452,489
Vehicles, except agricultural .....	74,549	79,886	107,039
Total .....	\$616,131	\$890,138	\$1,249,320

### Machinery Exports from the United States

(By Value in Thousands of Dollars)

	January, 1932	December, 1931	January, 1931
Locomotives .....	...	\$53	\$23
Other steam engines .....	\$10	120	51
Boilers .....	2	10	21
Accessories and parts .....	34	67	48
Automobile engines .....	157	89	177
Other internal combustion engines .....	191	237	302
Accessories and parts for .....	115	109	180
Electric locomotives .....	8	21	51
Other electric machinery and apparatus .....	185	365	444
Excavating machinery .....	143	206	356
Concrete mixers .....	7	3	18
Road making machinery .....	29	64	52
Elevators and elevator machinery .....	33	199	323
Mining and quarrying machinery .....	303	516	1,589
Oil well machinery .....	377	617	2,280
Pumps .....	500	258	354
Bending and power presses .....	40	226	413
Forging machinery .....	100	170	252
Machine tools .....	678	1,393	716
Rolling machines .....	18	53	381
Other metal working machinery and parts of .....	114	389	312
Textile machinery .....	487	560	558
Sewing machines .....	323	323	392
Shoe machinery .....	76	60	113
Flour-mill and gristmill machinery .....	5	15	16
Sugar-mill machinery .....	53	95	80
Paper and pulp mill machinery .....	18	90	156
Sawmill machinery .....	12	22	29
Other woodworking machinery .....	17	37	111
Refrigerating and ice making machinery .....	13	38	136
Air compressors .....	106	232	276
Typewriters .....	369	554	889
Power laundry machinery .....	56	24	80
Typesetting machines .....	103	159	268
Printing presses .....	73	198	163
Agricultural machinery and im-plements .....	892	8,661	12,299
Total .....	\$11,403	\$17,686	\$37,524

# AMERICAN

## BRIGHT TIN PLATES



— Highest Quality —

## COKES AND CHARCOALS

The base of AMERICAN Coke Tin Plates is good soft steel. These plates are carefully produced and are recognized standards with Tin Plate users.

We also manufacture AMERICAN Charcoals in grades adapted to particular requirements. Write for information.

AMERICAN Products supplied in Black and Galvanized Sheets, Formed Roofing and Siding Products, Special Sheets, Tin and Terne Plates for all purposes. Use KEYSTONE Rust Resisting Copper Steel for maximum service.



### American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION



AMERICAN BRIDGE COMPANY  
AMERICAN SHEET AND TIN PLATE COMPANY  
AMERICAN STEEL AND WIRE COMPANY  
CARNEGIE STEEL COMPANY

PRINCIPAL SUBSIDIARY  
COLUMBIA STEEL COMPANY  
CYCLONE FENCE COMPANY  
ILLINOIS STEEL COMPANY



MANUFACTURING COMPANIES:  
FEDERAL SHIPB'LDG. & DRY DOCK CO.  
MINNESOTA STEEL COMPANY  
NATIONAL TUBE COMPANY

OIL WELL SUPPLY COMPANY  
THE LORAIN STEEL COMPANY  
TENNESSEE COAL, IRON & RAILROAD CO.  
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—Columbia Steel Company, Russ Bldg., San Francisco, Calif.

Export Distributors—United States Steel Products Company, 30 Church St., New York, N. Y.



Ohio River, about 31 miles below Pittsburgh; lock walls, 70 ft. high, lifting capacity of 20 ft. Roller crest type dam, about 1600 ft. long, to be built later. Cost about \$3,000,000.

**Duquesne Light Co.**, Pittsburgh, has sold bond issue of \$5,000,000, part of proceeds for general operations, expansion and improvements.

**Bureau of Prisons**, Department of Justice, Washington, asks bids until March 17 for water and sewer systems at Northeastern Penitentiary, near Lewisburg, Pa., including 100,000-gal. elevated tank, equipment for disposal plant, 8-in. pipe lines, etc. Cost about \$90,000.

**Fletcher Enamel Co.**, Charleston, W. Va., manufacturer of enameled ware, aluminum ware, etc., is increasing operations at plant at Dunbar, W. Va., and will advance working quota from 275 to 400 this month.

**Romeson Mfg. Corp.**, Titusville, Pa., D. W. Campbell, receiver, will offer assets, real estate, etc., at public sale March 16, including foundry, machine shop, assembling plant units, power house and other structures.

**General Equipment & Mfg. Co.**, 830 Brackett Street, Northside, Pittsburgh, has been organized by John Kirch, 150 Arlington Avenue, and H. W. Findley, 819 Florence Street, to manufacture concrete mixers, shovels and other contractors' and road-building machinery.

**Norton Co.**, Worcester, Mass., manufacturer of grinding wheels, grinding machinery, refractory products, etc., has revised plans for three-story factory branch, storage and distributing plant, 70 x 100 ft., at Pittsburgh; bids to be asked in about 60 days. Ballinger Co., 105 South Twelfth Street, Philadelphia, architect and engineer.

**Mifflinburg Body Co.**, Mifflinburg, Pa., manufacturer of automobile bodies, has secured contract from Post Office Department, Washington, for 500 bodies for post office trucks.

## ◀ INDIANA ▶

**Board of Public Works**, Garrett, let general contract to W. A. Sheets, Construction Co., Cal-Wayne Building, Fort Wayne, for an addition to municipal electric light and power plant, 40 x 70 ft. A. M. Strauss, Cal-Wayne Building, Fort Wayne, architect.

**Hartman Mfg. Co.**, Vincennes, manufacturer of agricultural implements, an interest of Blount Plow Works, Evansville, has resumed operations following several weeks' curtailment.

**Baltimore & Ohio Railroad Co.**, Baltimore, has resumed operations at repair shops at Washington, Ind., following several weeks' curtailment, and will give employment to about 140 men.

**Brazil Aircraft Corp.**, Brazil, has been organized by P. C. Farris and J. C. Hutchinson, both of Brazil, to manufacture aircraft and aircraft equipment.

**L. G. S. Mfg. Co.**, Cornell Avenue, Indianapolis, manufacturer of free wheeling unit springs and other automotive equipment, a division of Cord Corp., Auburn, is running on day and night schedule, with capacity output of about 3000 units daily.

**Nickel Plate Railroad**, Cleveland, has reopened repair shops at Frankfort.

**Chicago, Indianapolis & Louisville Railway** has reopened a part of McDoel repair shops, Bloomington, following shutdown since December.

## ◀ DETROIT ▶

**United States Engineer Office**, Detroit, asks bids (no closing date stated) for one steel hull motor boat, 42 ft. long, 12½ ft. beam, and 6 ft. deep, for use at Sault Ste. Marie, Mich.

**Novo Engine Co.**, Lansing, Mich., manufacturer of engines, pumps, hoists, etc., is increasing operations at gray iron foundry and adding to working time.

**Ford Motor Co.**, Dearborn, Mich., will use new plant at Ypsilanti, Mich., on which work recently was started, for production of electrical equipment for automobiles. Cost about \$500,000 with machinery. Project will include power dam costing \$250,000 additional. Albert Kahn, Inc., Detroit, is architect and engineer. Company has taken bids for new assembling plant at Alexandria, Va., cost over \$100,000 with equipment.

**City Council**, Traverse City, Mich., plans erection of two pumping plants in connection with sewage treatment works. Hoad, Decker, Shoecraft & Drury, Ann Arbor, Mich., consulting engineers.

**Little Dutch Stamping Co., Inc.**, 3315 Barlum Tower Building, Detroit, has been organized by Abraham Kaufman and associates, capital \$50,000, to manufacture sheet metal parts, metal cans and containers, etc.

**Kewaunee Mfg. Co.**, Adrian, Mich., manufacturer of laboratory furniture and equipment, will concentrate on metal fixtures in future and production will soon begin on a complete line of metal furniture for science and home economic laboratories.

**Piston Ring Co.**, Muskegon, Mich., has acquired controlling interest in Accuralite Co., Muskegon, manufacturer of similar products, including piston pins, cylinder sleeves, etc., and will operate as a subsidiary.

**Hennebeck Tool Co.**, 5930 Commonwealth Avenue, Detroit, has changed its corporate name to Commonwealth Tool Co.

**Martinson Machine Co.**, Kalamazoo, Mich., contemplates one-story addition to plant in next two to three months.

**Independent Stove Co.**, Owosso, Mich., has adopted a five-day week schedule for production of line of oil-burning heaters and ranges.

## ◀ CLEVELAND ▶

**Cleveland Wax Paper Co.**, 13831 Triskett Road, N. W., Cleveland, manufacturer of processed papers, plans addition to cost over \$40,000 with equipment. Company recently acquired by Detroit Wax Paper Co., Detroit, and will operate as unit.

**Eaton Axle & Spring Co.**, East Sixty-fifth Street and Central Avenue, Cleveland, manufacturer of automobile axles, springs, etc., has arranged for change of name to Eaton Mfg. Co.

**City Council**, Uhrichsville, Ohio, is considering erection of municipal electric light and power plant. J. W. Lytle, mayor, is head of project.

**Belmont Stamping & Enameling Co.**, Dover, Ohio, has resumed production after two weeks' shut down, giving employment to normal working quota of 300 men.

**Industrial Rayon Corp.**, West Ninety-eighth Street and Walford Avenue, Cleveland, manufacturer of cellulose rayon products, has asked bids on general contract for four additions to mill, with main one-story unit of 50,000 sq. ft. floor space. Cost over \$175,000 with machinery. Christian, Schwarzenberg & Gaede Co., Union Building, architect and engineer.

**New York Central Railroad Co.**, Cleveland, has resumed full time operations at repair shops at Bucyrus, Ohio, adding about 125 men to similar quota reinstated in February.

**O. W. Randolph Co.**, Olive and Water Streets, Toledo, Ohio, manufacturer of grain dryers and other drying machinery, purchased site at Vinton Street and Nickel Plate Railroad, 150 x 160 ft., and contemplates new plant.

## ◀ ST. LOUIS ▶

**Board of Education**, Library Building, Kansas City, Mo., plans manual training department in three and four-story and basement high school for colored students. Cost about \$600,000. Charles A. Smith, Finance Building, architect; Nate W. Downes, same address, mechanical engineer.

**Eagle-Picher Mining & Smelting Co.**, Picher, Okla., let contract to Tri-State Contractors, Inc., Tulsa, Okla., for new central lead and zinc concentrating mill near Commerce, Okla. Cost over \$400,000 with machinery. R. J. Stroup is company engineer.

**Metropolitan Utilities District**, Harney and Eighteenth Streets, Omaha, Neb., closes bids about April 1 for new gas purifier for artificial gas plant. Cost over \$60,000. Plans are under way for addition to filter plant for municipal water purification.

**Dugdale Packing & Cold Storage Co.**, R.F.D. 5, St. Joseph, Mo., meat packer, let general contract to North St. Joseph Real Estate Co., South Sixth Street, for one-story and basement addition, 50 x 70 ft. Cost about \$35,000 with machinery.

**Missouri-Pacific Railroad Co.**, St. Louis, is increasing operations about 12 per cent in March, at repair shops at different points on lines, reinstating number of men.

**State Board of Control**, Capitol Building, Lincoln, Neb., has asked bids on general contract for one-story and basement shop, 50 x 120 ft., at boys' reformatory, Lincoln, for automobile license plate manufacture. Meginnis & Schaumburg, Federal Trust Building, architects.

**City Council**, El Dorado, Kan., has arranged special election on March 25 to approve bond issue for \$200,000 for installation of municipal gas distributing system and pressure station. Burns & McDonnell Engineering Co., Kansas City, Mo., consulting engineer; Emporia Engineering Co., Emporia, Kan., associate engineer.

## ◀ NEW ENGLAND ▶

**Board of Trustees**, Clark Institute for Deaf Mutes, Northampton, Mass., contemplates erection of two shop units, each two-stories and basement, about 40 x 80 ft., for vocational instruction.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until March 15 for one motor-driven engine lathe (Schedule 7589) for Boston Navy Yard; until March 22 for one motor with reducing gear and brake for hydraulic steering gear, control apparatus and spare parts, and one motor with reducing gear for hydraulic power plant, and spare parts (Schedule 7603); six torpedo impulse air flasks, four forged steel cylinders and four engine-steering air flasks (Schedule 7620); 10,600 lb. class A steel shafts (Schedule 7645) for Portsmouth Navy Yard.

**Tubular Products Co.**, Southington, Conn., has been organized by A. M. Smith and O. H. Bailey, both of Southington, to manufacture metal tubing, stampings, plate specialties, etc.

**School Board**, Dedham, Mass., has authorized installation of manual training shops in additions now under way. Cost about \$550,000. Edward T. P. Graham, 171 Newbury Street, Boston, is architect.

**Clear Ice Co.**, Danbury, Conn., care of Fred Hain, Meadow Street, South Norwalk, Conn., has plans by Harry Koerner, 83 Fairfield Avenue, Bridgeport, Conn., architect, for one-story artificial ice-manufacturing plant, 45 x 150 ft. Cost about \$50,000 with machinery.

**Berger Brothers Co.**, Derby Avenue, New Haven, Conn., manufacturer of surgical equipment, has asked bids on general contract for a five-story addition, 40 x 120 ft., including remodeling and improvements in present factory. Cost close to \$100,000 with equipment. Douglas Orr, New Haven, is architect.

## ◀ CINCINNATI ▶

**Constructing Quartermaster**, Wright Field, Dayton, Ohio, extended time for bids from March 2 to March 18 for new buildings at Patterson Field, Ohio, including disassembly hangar and final assembly hangar with annex, each about 111 x 200 ft.; two-story and basement administration building, 46 x 118 ft., and oil reclamation building. Cost about \$200,000.

**Board of County Commissioners**, Courthouse, Cincinnati, let contract to George Zimmer, Cincinnati, for one-story equipment storage and distributing building at Woodlawn, Springfield Township.

**City Council**, Paris, Ky., is considering erection of municipal electric light and power plant. Estimates of cost will be made by Black & Veatch, Mutual Building, Kansas City, Mo., consulting engineers.

**Mid-South Airways**, Memphis, Tenn., care of Anker F. Hansen, Shrine Building, architect, has plans for one-story hangar, 60 x 230 ft., with shop facilities, at municipal airport, Winchester and Airways Boulevard. Cost close to \$40,000 with equipment.

**Constructing Service, Veterans' Administration**, Washington, asks bids until March 22 for water-softening equipment for institution at Dayton, Ohio.

**Ford Motor Co.**, Dearborn, Mich., has increased working force at branch plant at Hamilton, Ohio, reinstating of about 400 men.

**City Council**, Cookeville, Tenn., is completing plans for water purification plant, capacity 500,000 gal. daily. Cost about \$35,000. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., consulting engineers.

## ◀ BUFFALO ▶

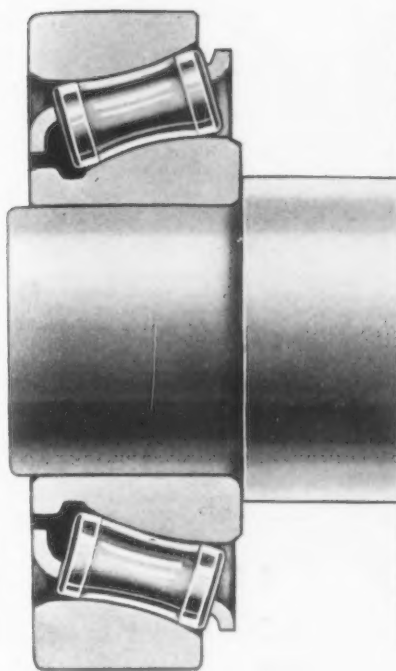
**Buffalo Electro Chemical Co.**, Tonawanda, N. Y., manufacturer of industrial chemicals, etc., let general contract to Jones Construction Co., Commercial Bank Building, Charlotte, N. C., for new factory branch, storage and distributing plant at Charlotte, about 20,000 sq. ft. floor space. Cost over \$35,000 with equipment.

**Tonawanda Foundry & Machine Corp.**, Tonawanda, N. Y., has been organized by George F. Phillips, 80 Chapin Parkway, and Homer H. Woods, 196 North Street, both Buffalo, to manufacture metal castings and operate general machine works.

**Superfine Paper Mills, Inc.**, Clayville, N. Y., has acquired factory at New Hartford, N. Y., for branch plant to be known as Capron Mill No. 2. Portion of machinery will be transferred from Clayville mill, where increased production facilities will be provided.

**Elmira Water, Light & Railroad Co.**, Elmira, N. Y., plans extensions in power system and distributing lines in Schuyler County; also extensions in gas distributing lines in Chemung County.

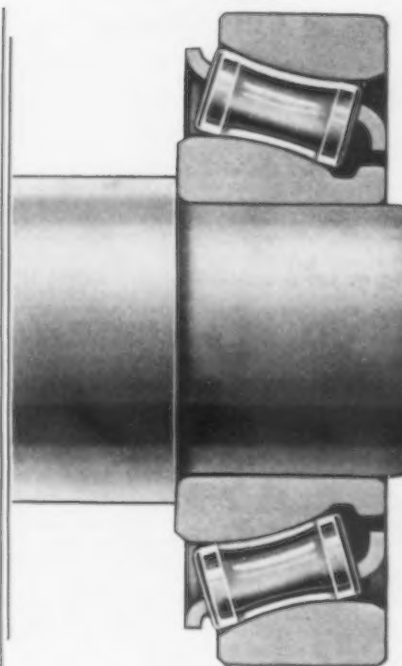




Practically no limit to the applications for which Shafer Roller Bearings are suited.

They provide generous capacity for radial loads, and combined radial and thrust loads.

Shafer self-alignment is always there when needed.

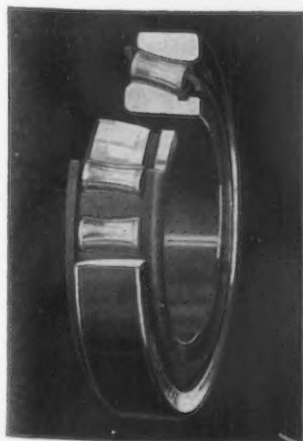


Note how effectively the exclusive Shafer radial-thrust design delivers full anti-friction efficiency over long periods of continuous service, under radial loads, or radial and thrust loads combined in any ratio.

Curved rollers and curved raceways assure free rolling and full efficiency, even under misalignment or shaft deflection. No wedging or pinching action of rollers under extreme thrust load or deflection. Therefore greater security with either average or tough jobs.

Naturally Shafer Bearings are widely used as standard equipment, in both single and double row types, also mounted in Shafer housings to make complete units, ready to install.

New Bulletin No. 501 completely lists all Shafer Single and Double Row Bearings. Special bearing sizes are built to specifications for quantity production requirements. Catalogue No. 11 and Bulletin A B C cover Shafer Roller Bearing Units, such as Pillow Blocks, Flange Units, etc. Attractive Shafer prices will interest you.



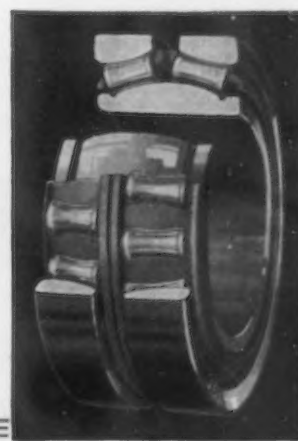
# SHAFER

RADIAL-THRUST

## ROLLER BEARINGS

SHAFER BEARING CORPORATION

General Offices: 621 S. Kolmar Ave., Chicago.  
Plant: 6501-99 W. Grand Ave., Chicago.  
Branch Stock: 173 Lafayette St., New York.



## ◀ CHICAGO ▶

Cromwell Paper Co., 4801 South Whipple Street, Chicago, filed plans for one-story addition, with foundations for second floor later, 100 x 250 ft., for storage and distribution. Cost over \$65,000 with loading, conveying and other equipment.

Signal Corps Procurement District, Chicago, asks bids until March 16 for 100 battery door tops, 120 terminal boxes, quantity of pipe bends, etc. (Circular 39); also quantity of head and chest sets (Circular 40).

Midwest Refining Co., 910 South Michigan Avenue, Chicago, subsidiary of Standard Oil Co. of Indiana, same address, has approved construction of electric power transmission line from electric power plant in Salt Creek, Wyo., district, to oil refining station at Casper, Wyo., about 38½ miles. Cost over \$80,000.

Minnesota State Building Commission, State Capitol, St. Paul, Minn., Henry Rines, secretary, plans early call for bids for motor-generator set for Capitol power plant. Pillsbury Engineering Co., 1200 Second Avenue South, Minneapolis, Minn., engineer.

A. B. Dick Co., 720 West Jackson Boulevard, Chicago, manufacturer of duplicating machinery and parts, plans immediate establishment of branch manufacturing plant at Toronto, Ont. A Canadian subsidiary is being organized to operate unit.

John Morrell & Co., Ottumwa, Iowa, meat packers, are arranging for erection of six-story and basement addition, 120 x 160 ft. Cost over \$250,000 with equipment.

City Council, Lake Forest, Ill., is considering installation of pumping machinery in connection with waterworks improvements and extensions to cost \$30,000. Work will start in spring.

A. B. T. Mfg. Co., 3311 Carroll Avenue, Chicago, manufacturer of coin-operated vending machines, parts, etc., let general contract to Gustav Lindell, 4601 North Avers Avenue, for two-story addition, 30 x 90 ft. Cost about \$50,000 with equipment.

Caspers Tin Plate Co., 3424 West Forty-eighth Place, Chicago, has arranged increase in capital from \$150,000 to \$300,000 for general expansion.

Donald C. Warburton, 1329 Claremont Street, Pueblo, Colo., is at head of project to operate airport near Pueblo-Beulah Highway, site now being purchased. Will build hangar with shop facilities, and other field units.

Sellers Mfg. Co., Chicago, has resumed operations after a shutdown of more than a year. Company manufactures railroad supplies and recent orders have enabled it to put back at work over 200 men. When in full operation the plant employs about 400 men.

## ◀ GULF STATES ▶

Guiberson Diesel Engine Co., Dallas, Tex., recently formed as an interest of Guiberson Corp., Forest Avenue, city, manufacturer of oil-well machinery, plans new shops on 37-acre tract of parent company for commercial production of Diesel oil engines for aircraft, including parts manufacture and assembling units. Cost over \$75,000 with equipment. S. A. Guiberson, Jr., is president of new organization.

Bureau of Supplies and Accounts, Navy Department, Washington, and Navy Yard, Pensacola, Fla., asks bids until March 22 for one gasoline engine-driven self-propelled crane with swinging boom (Schedule 7569).

Southern Container Corp., Commodore Point, Jacksonville, Fla., has leased three buildings, about 20,000 sq. ft. floor space, and will build several smaller units, for manufacture of corrugated paper boxes and other containers. Department will be installed for manufacture of veneer crates, etc. Cost over \$70,000 with machinery.

Howard Flint Ink Co., 2545 Scotten Avenue, Detroit, has plans for new branch plant for manufacture of printing inks at New Orleans, one-story, 60 x 200 ft., to be occupied under lease. Bids will be asked soon on general contract by Rathbone DeBuys, Hibernia Bank Building, New Orleans, architect. Cost about \$50,000 with equipment.

Board of Commissioners, Orleans Levee District, 603 Common Street, New Orleans, asks bids on general contract until March 29 for buildings for proposed airport on Lake Pontchartrain, including two hangars, 125 x 225 ft., cost about \$120,000 with equipment; one-story repair and reconditioning shop, 100 x 120 ft., cost \$35,000; two-story administration building, 70 x 300 ft., cost \$170,000 and one-story emergency and storage unit. National

Airport Engineering Co., Ltd., 775 East Washington Boulevard, Los Angeles, engineer; John Klorer, chief engineer for board.

Southern Laboratories, Inc., Meridian, Miss., is arranging establishment of works for production of electric storage batteries.

City Commission, Jacksonville, Fla., is considering construction of power transmission line and facilities from generating plant on Talleyrand Avenue to substation on Laura Street. Cost about \$80,000; also contemplates extensions and improvements in electrical distributing system. Cost over \$100,000 with equipment. Fred H. Koerber is superintendent of electrical distribution department.

Avondale Mills, Thirty-ninth Street and First Avenue, Birmingham, plans expansion and improvements at different cotton mills, with installation of machinery to cost over \$300,000.

Board of Trustees, Texas Agricultural and Mechanical College, College Station, Tex., asks bids on general contract for new agricultural engineering building on campus. Cost about \$200,000 with equipment. F. E. Giesecke is college architect, address noted.

Common Council, Tuscaloosa, Ala., has called special election March 14 to approve bonds for \$75,000 for extensions and improvements in Riverview waterworks pumping plant, including installation of filtering machinery and other equipment.

## ◀ MILWAUKEE ▶

Outboard Motors Corp., 4143 North Twenty-seventh Street, Milwaukee, which recently announced addition of bicycle engines to line of boat equipment, is about to introduce a power lawn mower as further extension of business.

Sturgeon Bay Boat Works, Inc., has been organized at Sturgeon Bay, Wis., to manufacture boats, marine equipment, etc. Capitalization is \$50,000. Principals are Palmer Johnson, Valmar G. Bird and B. L. Parker, all of Sturgeon Bay.

Manitowoc Shipbuilding Corp., Manitowoc, Wis., is entering field of manufacturing welded domestic heating boilers as extension of marine boiler production.

Plant Food Appliance Co., Waupaca, Wis., has been incorporated by James H. Dance, Ira A. Christoph and Reuben S. Bergen to manufacture machinery and devices designed for application of commercial fertilizers on farms, ranches, etc. Initial capitalization is \$8,000. Shop space will be leased for present.

Gordon Metals Corp., 627 East Polk Street, Milwaukee, refiner of non-ferrous metals, reports February shipments more than 50 per cent above January, which ranged 40 per cent above same month in 1931. Practically all of increase has been in brass, bronze and aluminum. Lead, zinc and babbitt business remains quiet.

## ◀ PACIFIC COAST ▶

Los Angeles Water and Power Bureau, Los Angeles, has applied to City Council to call for vote on bond issue of \$34,400,000 at special election May 3, fund to be used for erection of steel tower transmission from Boulder Dam to Los Angeles, cost \$17,500,000; construction of auxiliary steam-operated generating plant of 120,000 kw. capacity at Los Angeles Harbor, cost \$11,240,000; and extensions and improvements in electrical distribution system in city, \$5,660,000.

C. L. Arques Shipbuilding Co., Sausalito, Cal., plans rebuilding part of ship repair plant, recently destroyed by fire. Loss about \$30,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until April 6 for equipment, high and medium pressure air and helium piping and accessories for re-nurification of helium gas at naval air station, Sunnyvale, Cal. (Specification 6761).

Keystone Engineering Co., 1442 South San Pedro Street, Los Angeles, operating general machine works, filed plans for one-story shop addition, 42 x 50 ft. Leonard C. Jones, 1548 West Seventh Street, architect.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has begun extension and improvements at Potter Valley hydroelectric power plant, near Ukiah, Cal., to include installation of additional equipment and replacement of part of present machinery. Cost over \$100,000.

State Building Commission, State Capitol, Salt Lake City, Utah, is considering new central power house at State school for deaf and

blind, Ogden, Utah. Cost about \$50,000 with equipment.

Great Northern Railroad Co., St. Paul, Minn., let general contract to A. Guthrie & Co., Sherlock Building, Portland, for new engine house and machine shops at South Klamath yards, Klamath Falls, Ore., to replace unit on west of Klamath River to be dismantled. Cost about \$100,000 with equipment. Frederick Mears, assistant chief engineer, Seattle, in charge.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 15 for one motor-driven portable flexible shaft machine (Schedule 7585), one foot-operated squaring machine, one motor-driven slip roll forming machine, and one motor-driven combination turning wire and beading machine (Schedule 7580), one motor-driven back-gear screw cutting type lathe (Schedule 7583); until March 22 for 12 corrugated boiler furnaces (Schedule 7608), 20,000 lb. slab zinc (Schedule 7611), 1000 aircraft float lights with water impact fuses (Schedule 7616) for Mare Island Navy Yard; one centrifugal horizontal pump (Schedule 7619) for San Diego Navy Yard; two electric baking ovens and spare parts (Schedule 7622) for Puget Sound Navy Yard.

W. C. Mumaw, Columbia Steel Corp., Portland, is interested in project to construct tramway system to top of Mount Baldy, 3900 ft., near Aberdeen, Wash., for sight-seeing service. Cost close to \$200,000.

## ◀ CANADA ▶

British Columbia Sugar Refining Co., contemplates an addition to its plant at Raymond, Alta., to cost \$250,000, large portion of which will be expended for machinery.

H. D. Fearman, commissioner of publicity and industries, Hamilton, Ont., states that negotiations have been completed whereby National Steel Car Corp., will manufacture products of La Plant-Choate Mfg. Co., Cedar Rapids, Iowa, exclusively for distribution in Canada. Hamilton plant will build American company's full line including snowplows, bulldozers, dump-wagons, tractor trailers, etc.

Atlas Construction Co., Ltd., has been awarded contract for enlargement of waterworks plant at Point St. Charles, Montreal, to cost \$580,705. Project will include erection of new buildings and installation of six large pumps.

Westminster Iron Works, Ltd., New Westminster, B. C., suffered loss of \$50,000 to its plant recently damaged by fire.

International Peat Fuels, Ltd., St. Hyacinthe, Que., has been formed to take over Hydro Peat Co. New owners will build plant addition.

## ◀ FOREIGN ▶

Toho Electric Power Co., Tokyo, Japan, has plans for new steam-operated electric generating plant at Sunmatakawa, capacity 65,000 kw. Cost over \$750,000 with transmission lines.

Titanium Products Pty., Ltd., Melbourne, Australia, recently organized, will establish new plant for manufacture of titanium oxide pigments and allied products, and will develop raw material supply of ilmenite from King Island, near coast of Tasmania, where deposits have been acquired. Cost over \$100,000 with equipment.

Soviet Russian Government, Moscow, under direction of Division of Vocational Training Schools for young workers (Fabzavuch), plans group of 106 vocational and manual training schools in different parts of country during 1932, to cost about 17,200,000 rubles (\$8,600,000) with equipment. Coal Trust of Government is arranging expansion program for 1932, including installation of equipment in 31 coal-mining properties in Donetz Basin district, for complete mechanization from mining to loading. Program will be continued next year until all coal mines are mechanized. Amtorg Trading Corp., 261 Fifth Avenue, New York, official buying agency.

Banco de Mexico, El Mante, near Villa Juarez, Tamaulipas State, Mexico, headed by General Plutarco Elias Calles, war minister, is interested in company recently formed by General Calles and associates to build railroad 385 miles long to serve sugar mill and district in which it operates. Company has secured concession to operate as private railroad and work will be placed under way at once. Rolling stock, shop facilities and other equipment will be purchased.

Yasaka Hydro Power Co., Tokyo, Japan, subsidiary of Daido Power Co., same address, plans erection of new electric generating plant at Taihu, with capacity of 60,000 kw. Transmission line will be built.

000 with

l, Minn.,  
& Co.,  
w engine  
Klamath  
ace unit  
mantled.  
Frederick  
attle, in

Navy De-  
il March  
ble shaft  
-operated  
slip roll  
ven com-  
machine  
ck-geared  
83); un-  
furnaces  
Schedule  
h water  
re Island  
al pump  
ry Yard;  
re parts  
y Yard.

on., Port-  
construct  
ldy, 3900  
ht-seeing

Co., con-  
taymond,  
of which

publicity  
ates that  
reby Na-  
nufacture  
o., Cedar  
ution in  
American  
ws, bull-  
etc.

as been  
f water-  
ntreal, to  
ection of  
six large

w West-  
00 to its

yacinthe,  
r Hydro  
addition.

pan, has  
generat-  
y 65,000  
ion lines.  
elbourne,  
establish  
um oxide  
will de-  
ite from  
a, where  
\$100,000

w, under  
Training  
h), plans  
training  
y during  
,600,000)  
nment is  
t, includ-  
coal-min-  
rict, for  
to load-  
ext year  
Amtorg  
ew York.

ar Villa  
eaded by  
nister, is  
rmed by  
railroad  
d district  
secured  
road and  
ce. Roll-  
equipment

Japan,  
address,  
ing plant  
Trans-